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ABSTRACT

The 14 articles in this collection demonstrate the range of uses of technology for the improvement of participation and retention of students in years 11 and 12 in the rural post-primary schools of Victoria, Australia. An agreement negotiated with the Commonwealth Government, which is known as Resource Agreement 3 (RA3), operated during 1987-88 and was instrumental in forming 83 rural post-primary schools into 17 clusters, each consisting of 2 to 9 schools. The clusters proposed ways of sharing equipment and human resources, and ways of using communication technology for overcoming the large distances. Programs initiated as a result of local decision making within the clusters include: (1) adaptation of Macintosh computer technology to suit specific purposes or tasks in existing subjects; (2) establishment of a system providing information on careers, occupations, post-college options, and future schooling; (3) a course that joins traditional craft subjects with the technology necessary for project design and construction, as well as hands-on experience with machinery; (4) a commercial sewing course; (5) an environmental science program; (6) information networks and foreign language instruction via satellite; and (7) music studies. (DB)

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CURRICULUM AND TECHNOLOGY IN SCHOOLS
EXPANDING ALTERNATIVES IN RURAL SCHOOLS

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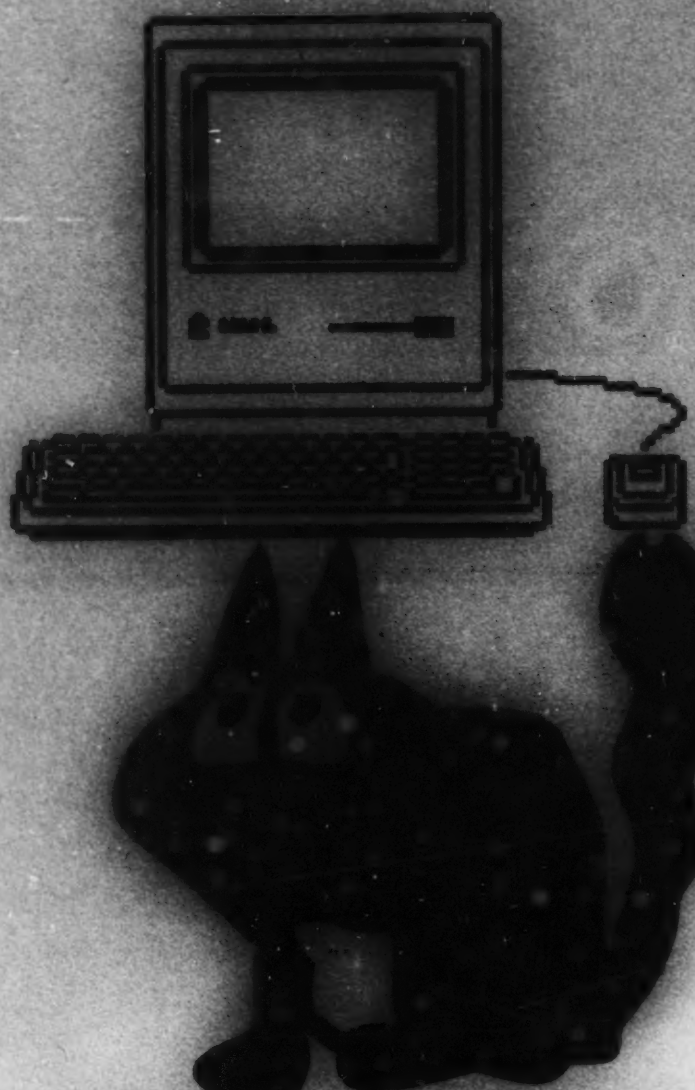

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Ministry of Education, Victoria (Office of Schools Administration)
Advisory Committee for Resource Agreement 3, Using Technology for the Improvement of Participation of Country Students in Years 11 and 12
Edited by Ivan Margitta.

Curriculum And Technology in Schools: Expanding Alternatives in Rural Schools

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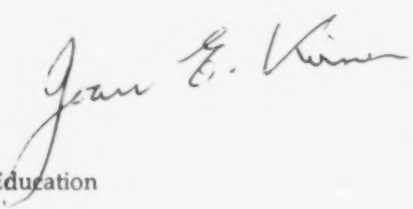
Foreword

The Government of Victoria is committed to providing a quality education for all students. One policy focus in line with this commitment has been on the improvement of retention in Years 11 and 12.

A major initiative has been the introduction of the Victorian Certificate of Education. Another initiative has been to negotiate with the Commonwealth Government a Resource Agreement for using technology for the improvement of participation of country students in Years 11 and 12. This agreement, which became known as Resource Agreement 3 (RA3), operated during 1987 and 1988, and further funding was granted in 1989 to cover recurrent costs of existing programs.

Most rural Post-primary schools in Victoria are located in small towns distant from larger centres of population. The availability of funding through RA3 has challenged the school communities to consider how technology could be used toward local solutions of improving participation at the senior levels of their schools. The RA3 program has been instrumental in 83 rural post-primary schools forming into 17 Clusters, ranging from 2 schools to 9 schools. They proposed ways of sharing equipment and human resources, and ways of using communication technology — telematics — for overcoming some of the isolation caused by the large distances between them.

The articles in this collection demonstrate the range of programs initiated as a result of local decision making within the Clusters. I am particularly pleased to see teachers and principals of schools, participants in the projects, writing and giving us the benefit of their experience. The articles demonstrate that RA3 has been a means of revitalising schools so that they can better serve their communities: schools participating in RA3 are at the forefront of school improvement.



Joan Kirner

Minister for Education

Curriculum And Technology in Schools: Expanding Alternatives in Rural Schools

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Information Technology

What this means in the Mallee Secondary College Cluster.
By John Brookshaw

Rather than creating specific subjects and teaching about 'Information Technology', the Mallee Secondary College Cluster has found that by using existing subjects and adapting the technology to suit specific purposes or tasks, the students are more motivated and see education as being meaningful. These purposes or tasks have expanded the scope and purposes of the technology.

As Australia moves into an information economy people need to be able to utilize information technology, to have confidence in their ability to adapt to rapid change, and to appreciate and evaluate the associated social implications.

Information Technology in the Mallee Secondary College Cluster is not only a pedagogical study, it is becoming a practical experience permeating the curriculum of each college. Students and staff are acquiring computer related skills and knowledge, learning experiences are being enhanced, and classroom strategies are improved.

The Mallee Secondary College Cluster through necessity have provided real access to this innovative technology for their students and staff.

Implementation Strategies

In cluster schools there was a computer person who taught about computers. We had 'computer literacy', 'computer awareness', 'computer programming' classes designed to teach about computers. We wanted to transcend this elitist notion and have all staff teaching with computers. All students and staff could be successful users.

Our cluster has chosen the Macintosh computer as its basic computing machine, although this hasn't precluded us from investing in other varieties for specialist applications. The Macintosh is easy to learn, is very powerful, and transportable. Software has a common interface, and higher levels of skill can be achieved with little practice. More importantly the hardware and the software become very quickly transparent to the application and purpose for its use. The Mac has been dubbed; "the computer for the rest of us", and from our experience this has proven true.

Professional development

To increase the professional development of staff, a Mac, a printer and scanner were initially placed in the staff room of each school for sole use of the teaching staff; for the preparation of lessons, administrative reports and professional development. If students were to employ the computer as a tool, staff of the cluster schools had to be seen using these machines for their preparation.

Information technology is an integral part of Technology Studies units at the Mallee Secondary Cluster.

By comparing previous manual attempts at similar exercises, students are able to realistically relate to how information technology effects individuals and organisations in society.

After a twelve month trial period, the staff room computer equipment is in constant demand and consideration will be given to making another computer available to the staff. Computers have made the clerical aspect of teaching easier. Improved quality of publications, easier lesson preparation, ability to store and retrieve information from disks have all contributed to this improvement in efficiency.

Access to computing resources

Two tekpaks each containing ten Macintosh Plus microcomputers, hard disks, laser and dot matrix printers and other peripheral devices are shared between the schools for one semester each year. These resources are used to meet the needs of the Information Technology and the Computer Aided Graphics courses, and enrich the learning outcomes of the more traditional areas. (English and process writing, Art and Screen printing, Graphics, design and technical drawing, History and Geography, Music, Mathematics and Textiles.)

Each cluster school has committed and enthusiastic teachers who acts as a resource persons and facilitate the professional development of the staff.

Curriculum processes

Rather than labelling specific subjects, and teaching about 'Information Technology', already existing subjects have adapted the technology to enhance their area of the curriculum. The computers are being used in classrooms for specific purposes or tasks. These projects have expanded in their scope and purpose by the introduction of the technology.

Consider a mundane task for year nine mathematics students: compile different country football league ladders from the results published in Monday's newspapers. A simple exercise in the calculation of percentages, tabulating results and a practical example of 'real life mathematics'. Incorrect and neglected results in the newspapers caused inaccuracies. Students contacted league secretaries who happily faxed results through to the school immediately. Monday mornings' classes entered the results on a spreadsheet which accumulated the results from previous matches and maintained a statistical analysis.

A common exercise which teaches a mathematical skill in a practical manner, enhanced by students using a computer and a facsimile machine. A technique to process, manage and transmit information is examined within the framework of an existing course.

An English exercise in the cluster is: interview a close member of the family about growing up and changes they have seen in this period. From this interview an essay is compiled and presented to the class. By allowing each student to borrow a Macintosh over several nights, this story was done on a word processor. All the class results were laser printed and compiled into a book for all students and families.

This is communications exercise to show students another technique of processing and managing information. By comparing previous manual attempts at similar exercises, students are able to realistically relate to how information technology effects individuals and organisations in society.

Information Technology courses that teach about the technology do exist. They are applications based and are designed around the interests of the students. Most involve practical problem solving and encourage open ended learning. (Desk top publishing, graphical design, technical drawing, word processing, statistical analysis, and drawing.) By encouraging this approach the cluster schools are developing a software user base that has wide expertise in many facets of information technology. This experience can be used to teach other students and staff, employed within the wider community on specific projects and enhance the employment prospects of senior students.

Subject areas

Technology is used in our cluster over a disparate range of curriculum areas. Lego robotics is used to simulate many industrial settings. A Numeric Controlled Lathe in the engineering field gives students access to an innovative machine. The concepts involved in these practical activities link theory and the 'real world' applications of many traditional fields of study. Teaching using telematics broadens the access of senior students to VCE subjects and provides a working example of information management and transfer. The computerization and networking of all libraries in the cluster provides students with efficient access to a wider variety of resources and information.

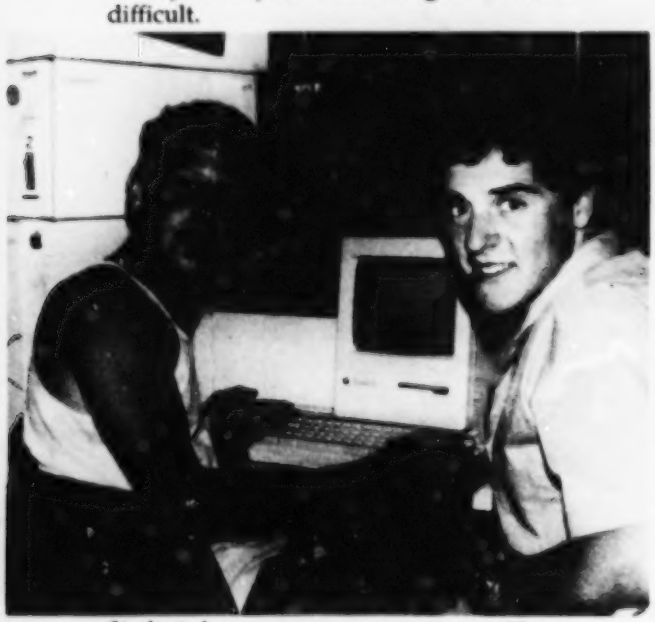
Information Technology in our cluster is being structured so that there is little distinction between teaching about computers and teaching with computers. 'Information Technology' should not be perceived as only a space on the timetable where content is taught. It is more about the ability to adapt. To employ this information and technology rather than be manipulated by it. Skills learned using this equipment should be transferable to other school work and personal use.

Information Sharing

In the West Wimmera Secondary Colleges
By John Schmidt

Enrolment predictions into the 1990's see a drastic fall in student and staff numbers in all of the Secondary Colleges in the Mallee Secondary College Cluster, so effective use of the remaining resources was essential. Stereotyping of roles and occupations was difficult to break down in small rural towns which have a narrow range of available occupations.

The formation of the W.W.S.C. Cluster gave the six Colleges: Kaniva, Nhill, Dimboola, Warracknabeal, Rainbow and Hopetoun the opportunity to examine future directions, and how, as a group of Colleges, we could cater for the changing needs and demands of our students in the 1990's. As a result of discussions generated at a Cluster Curriculum Day in 1987, the Careers Teachers and Librarians felt that to assess and prepare to implement the proposals and structures as outlined in the Frameworks and VCE areas in the 1990's, College retention rates had to be addressed. Colleges in our Cluster are relatively small, and the flexibility to offer a wide variety of subjects is becoming much more difficult.



Students have easy access to computers. They are available for use before school, during the school day, and after school.

Catering for changing student and staff numbers and changing syllabi

Enrolment predictions into the 1990's see a drastic fall in student and staff numbers in all of the Secondary Colleges in our Cluster, so effective use of our resources is essential. Resource Agreement 3 aims to improve retention of students, especially in years 11-12, and with the release of Job and Course Explorer (JAC) by the Ministry, the time was right to seek assistance via a submission.

The majority of students in this region do not have the ready access to professional guidance counsellors, or the awareness (observable) of the variations of their post Cluster options. Stereotyping of occupations and roles is a barrier that is difficult to break down in small rural Secondary Colleges in small rural towns with a narrow range of occupations present. Equal opportunity, especially for girls, was identified as an issue of concern in areas where lack of role models exist, or are accessible. Our objective was to establish a system that would provide readily accessible information that would enable students to discover for themselves the broad range of occupations, and offer them assistance in questioning their own perceptions and values about future schooling, selection of subjects, and post College options.

Getting suitable systems and materials

The aim of the technology package was to be able to provide the students within this Cluster the best possible education with the resources at our disposal. The submission that was finally drawn up in September 1987 by Librarians and Careers Teachers from the Cluster Colleges, outlined how, as a group of Colleges, we could adapt to these changes to assist our students. In

... we felt we would be in a better position to cater for the needs of our students by enabling them, to evaluate their own skills, needs, abilities and alternatives.

Job and Course Explorer *help students explore possible careers.*

developing and utilizing a broad range of resources (which have only just become available, JAC, Grolier Electronic Encyclopedia, Sigi Plus) we felt we would be in a better position to cater for the needs of our students by enabling them, to evaluate their own skills, needs, abilities and alternatives.

The JAC system is an easy to use computer program that contains details of over 1,177 accredited post secondary courses, and over 450 jobs, from which students will be able to obtain information, identify courses, and obtain job details that suit their needs and interests. Printouts of selections are a feature of this system and will enable Careers Teachers to spend more time with students in relation to vocational options, and alleviate some of the frustration in the difficult task of deciding on what subjects to select for a career path.

The hardware purchased for this was an IBM PS/2 Model 30 with a 20 meg hard disk, colour monitor, and Epsom printer, for each of the six Cluster Colleges.

IBM's were chosen as we felt that they had a superior backup network, and software guarantee was assured. The hardware selected had to be able to cope with further software purchases, hence the need for a hard disk. A user friendly system was considered essential, to allow students easy access, without requiring a detailed knowledge of computers. To facilitate this, an applications manager has been installed.

The JAC program is already being extensively used by students. The cluster submission also sought a counselling/guidance package called Sigi Plus. JAC is designed to help users make informed decisions in selecting careers and courses. The Sigi Plus program, still be to converted to the Australian version by A.C.E.R., is designed to help those students in the senior levels define and critically evaluate their values, skills, etc., and offers the user selected pathways. It would comprehensively complement JAC; an invaluable tool for Careers Teachers to assist those students who are uncertain as to their future vocational path. The aim is to purchase Sigi Plus when available, in mid 1989.

Careers teachers were surveyed on the situation in their College before JAC and the IBM's arrived, as part of an evaluation of the impact of the whole project in the Cluster.

A lack of time, access to students, and a scattering of resources, were common problems identified by the teachers. A shortage of visiting speakers from outside the geographic area and the narrow vision of the careers/jobs by both students and parents were also seen as additional problems.

Whilst JAC will not bring guest speakers to the area or give teachers extra time, it has the ability to give a wide variety of information quickly and easily. JAC provides detail that had previously to be hand accessed from drawers of filing cabinets and it gives the users information with which they can ask Careers Teachers more informed or higher level type questions.

Associated with this package is the purchase of software to develop information links between the Colleges especially in the area of work experience, and an exchange/borrowing link of resources between the six colleges, serviced by the cluster courier service.

We are very enthusiastic about the possibilities.

John Schmidt has been teaching History, Social Science, Geography and Careers for 14 years, the last 12 years at Nhill Secondary College. John has been particularly concerned about the limited horizons of rural post-primary school students, the limits of ideas about things outside their own environments.

Joining Materials

In the Mallee Secondary College Cluster
By Andrew Haste

Traditional craft subjects (Metalwork and Woodwork) have been taught in our school for many years. With the introduction of Technology Studies through Frameworks and the new VCE, it became evident that these subjects were no longer appropriate in their accepted ways. Students needed to become involved in all aspects of project design and construction and gain experience with up-to-date machinery and processes.

The teaching of how materials can be joined has natural links with other curriculum areas such as Graphics, Maths, Chemistry and Physics.

Joining Materials forms one of nine Technology Studies subjects resourced by the Mallee Secondary Colleges Cluster (MSCC) through the funding of Resource Agreement 3 and the Country Education Project. A total of eleven subjects are now resourced by tekpaks in the MSCC, with schools having access to each tekpak for one semester at a time.

Technology for the times

Traditional craft subjects (Metalwork and Woodwork) have been offered in most of our school for many years, but a lack of individual resources and a regular turnover of staff have seen a decline in this area in some schools. TAFE has serviced our schools over several years with subjects such as welding, automotive and farm building. However, these subjects have tended to be teacher directed and somewhat skills and vocationally orientated.

With the introduction of Technology Studies through Frameworks and the new VCE it became evident that this style of delivery was no longer appropriate. There was a need for students to become involved in all aspects of project design and construction and they should direct their own learnings as far as possible. It was also necessary that students gain experience with up-to-date machinery and processes that were largely uncommon in our schools.

The MSCC operates two Joining Materials tekpaks that include the following equipment: MIG and TIG welders, air plasma cutters, resistance welders, tube and pipe benders, angle grinders and assorted clamping devices. All schools now have appropriate working spaces and a minimum amount of suitable equipment permanently on site.

The course introduces students to a variety of machines and processes associated with the joining of a wide range of materials such as ferrous and non-ferrous metals, polymers and

The subject has been developed so as to be relevant to the students, the local communities and current educational trends. . .

timber. The course is practically orientated with as much time as possible being devoted to hands on experience. However, to reinforce these experiences a certain amount of related theory in the form of videos, worksheets, design briefs and industrial visits, is included.

Access and success for a wide range of students

Individual student outcome in Joining Materials is directly related to their pre-entry knowledge. Therefore the course offers access and success to a wide range of students. For example, at Ouyen Secondary College in 1988, 15 students enrolled in Joining Materials. Of these 15 students, 5 were girls and a total of 10 students had no recent experience with a metalworking subject. All students were able to successfully complete a compulsory project and a major project of a design negotiated between themselves and the teacher. These projects obviously varied in their complexity due to the difference in each students prior knowledge. A group of four students designed and constructed a canopy for the school's camp trailer, two students designed and constructed weight benches while other students attempted less ambitious projects.

Links with other curriculum areas

Links to other areas of the curriculum are being forged and extended. Joining Materials has natural links with other curriculum areas such as Graphics, Maths, Chemistry and Physics. These links create relevancy to students. They don't see individual subjects in isolation and they gain an ability to apply their knowledge confidently in a wide range of outcomes.

Tekpak resources to reinforce concepts

Teachers in other areas of the curriculum are encouraged to use the tekpak resources to reinforce concepts that they are teaching. For instance Chemistry students studying the characteristics of heat and metal may be able to carry out experiments involving welding and its effects on the structure of the material. Mathematics teachers can involve students in calculations on bending steel tube to reinforce practical trigonometry and the use of formula.

I believe that the Joining Materials unit has been a success so far, and has achieved the aims of Resource Agreement 3. The subject has been developed so as to be relevant to the students, the local communities and current educational trends and has increased students technical literacy, their questioning ability and adaptability, and hopefully will enable them to make rational informed decisions on things that affect their lives.

Andrew Haste is the technology studies coordinator at Ouyen Secondary College. He was the first technology studies teacher recruited by the Cluster and along with his five colleagues in the other Cluster colleges he has been pivotal in designing and introducing many of the Cluster subjects. He is in his second year of teaching and he teaches joining materials, engineering technology, computer assisted graphics, metalwork and control technology.

Commercial Sewing

In the Mallee Secondary College Cluster

By Melanie Jackson

Commercial Sewing is a course designed to be run as a small business where students make clothing and other textiles related goods for sale to the public. While business principles are part of the course, consideration is also given to the career aspect. Emphasis is mainly placed on the construction of garments or items for sale. The course is designed to give students an insight into real-life situations and to make them aware that they have a saleable skill.

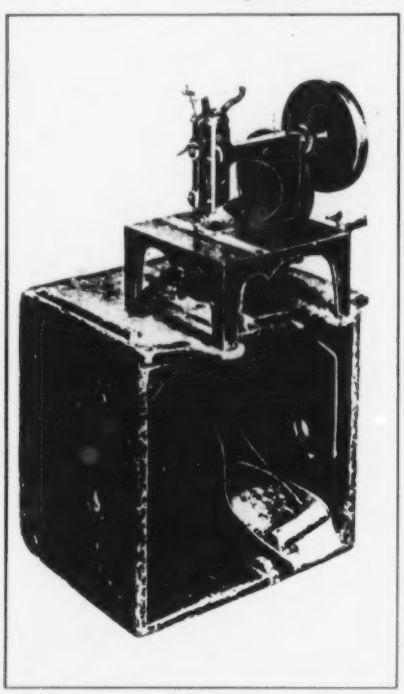
In the beginning, we took delivery of two Pfaff Computerised Domestic sewing machines, a Janome four thread overlocker and $200.00 venture capital provided by the Mallee Secondary College Cluster. Another Pfaff machine was available depending on class size.

This new resource of a Commercial Sewing Tekpak is to be shared between the M.S.C.C. schools who run the subject on a semester basis.

We were faced with the challenge of writing curriculum for a new subject, Commercial Sewing, which embraces various facets of a broad range of subject areas.

The school's 'Company Proprietry Limited'

These aims are achieved through the establishment of a 'company' complete with its positions of responsibility. Each student is elected to a management role and is expected to fulfil the duties of that department. Board meetings are run periodically to encourage communication between the departments.



Initially it is a daunting prospect to be running a small business with no previous exposure to business principles or practices. The availability of a 21 week small business unit produced by School Industry Project Worker, Vic Jackson, easy availability of information from the Small Business Development Corporation, and frequent communication with the leader of another Commercial Sewing unit within the cluster schools have given much food for thought.

As the course developed, the direct correlation between numerous other subject areas becomes increasingly apparent. The course begins with a simple introduction to business terminology and progresses to become more involved with the legalities and the problems and regulations involved in the selection of a company name. The company structure and the roles and responsibilities of the company directors are closely examined.

Community awareness has been fostered through demonstrations of our advanced machinery at local shows.

Getting commercial contracts

Currently we attempt to complete work on a contract basis with the view to expanding to original clothing in the not too distant future. We use the assembly line approach rather than individuals completing a whole garment.

Commercial Sewing is open to a broad range of teaching strategies. Demonstration, discussion, use of relevant videos and guest speaker are but a few we have used in our first semester.

How the electronic communications equipment is used

Computers become a valuable asset and are used extensively throughout the course in the design of the company logo, stationary and label, and the designs to be made and processed onto Riso screen printing screens which transfer the image to our product. The computer is also used in a word-processing capacity for any correspondence or writing up the minutes of the meetings.

The facsimile machine becomes a valuable resource in obtaining efficient and direct information relating to the course, from other schools, as well as promoting an awareness of our existence. This promotion is especially important if we are to obtain adequate contractual work to function.

Community awareness has been fostered through demonstrations of our advanced machinery at local shows. They are operated by students involved in the course. A newspaper article is prepared and submitted to local publications by the head of our advertising department.

Our extension of the course to encompass as many aspects of a realistic textiles industry as possible from the designers table to the packaging of merchandise interests a broad sector of students. A student comment of 'There was a feeling of satisfaction when the first garment lay completed on the table' appears to sum up the current feeling for this new subject area.

Melanie Jackson is in her second year of teaching at Ouyen Secondary College. She accepted the challenge of teaching Commercial Sewing after the convenor of the Commercial Sewing program team was transferred to another cluster school.

An Environmental Science Tekpak

Developments in the Heytesbury Cluster

By Pat Nicholson

From a grandiose initial concept that may have been unworkable in the classroom, a set of developmental stages was devised to make the final product achievable. A major consideration was the development of easily-usable tekpaks of materials that could be placed in the classroom and accessible to the teacher as well as the students.

The first thoughts about the use of RA3 money was to obtain 'things' for science producing a shopping list of items that are available, but schools could not afford. It became obvious that the first job of the group was to enable staff to get to know one another. Then we were able to consider the things that would be good to develop together without the worries of giving away our ideas. In many ways the getting to know one another was the hardest part of the program, the sharing of ideas and the releasing the most hidden desires for the classroom was needed if we were to make a success of the project. After a number of such meetings, that didn't produce any stirring ideas, one member suggested a Data Logger. This stimulated the group and we were away.

Design of the program

From this idea it was some time before we were able to design a package that satisfied the needs of all those who had a say in the project, schools, teachers and the Resource Agreement Advisory Committee. As a result of this communication which developed after the initial meetings, new ideas began to flow much more readily and a number of important improvements were added to the project. From the grandiose initial concept, that would have been unworkable in the classroom, a set of developmental stages was devised to make the final product achievable.

Development of the program

It became obvious that the program as set out needed a set of simple graded tasks from the simple classroom activities to the long-term goal. This became the TIER program. There were three tiers. TIER 1 is the in-classroom activity to introduce the equipment and its use. TIER 2 the short one-to-two-hour outside activity. TIER 3 the long outside program, possibly using more than one school and exchanging data obtained.

A major consideration was the development of easily usable tekpaks of materials that could be placed in the classroom and be accessible to the teacher as well as the students. To help us make informed choices about the way to go an inservice activity was planned for all interested members of staff on the last day of term two. Those who attended the activity included teachers, students, parents, manufacturers and interested farmers. Information was given about the development to that stage by the 'informed' members of the working group.

The first thoughts about the use of RA3 money was to obtain 'things' for science producing a shopping list of items that are available, but schools could not afford.

The speakers explained—

- How the program came about
- What equipment had been considered
- What the capability was of the equipment
- What methods have been successfully used to write effective material
- Other applications the equipment has outside science.

As a result of this approach, many more people became involved in the project and began to make an input.

Pat Nicholson teaches Mathematics and Science at Timboon High School. Trained as a Chemist, Pat taught at a number of Metropolitan Post-primary schools before shifting to the Heytesbury district. Since 1978 he has been teaching at one of the Heytesbury Cluster schools, either Timboon High School or Camperdown High School.

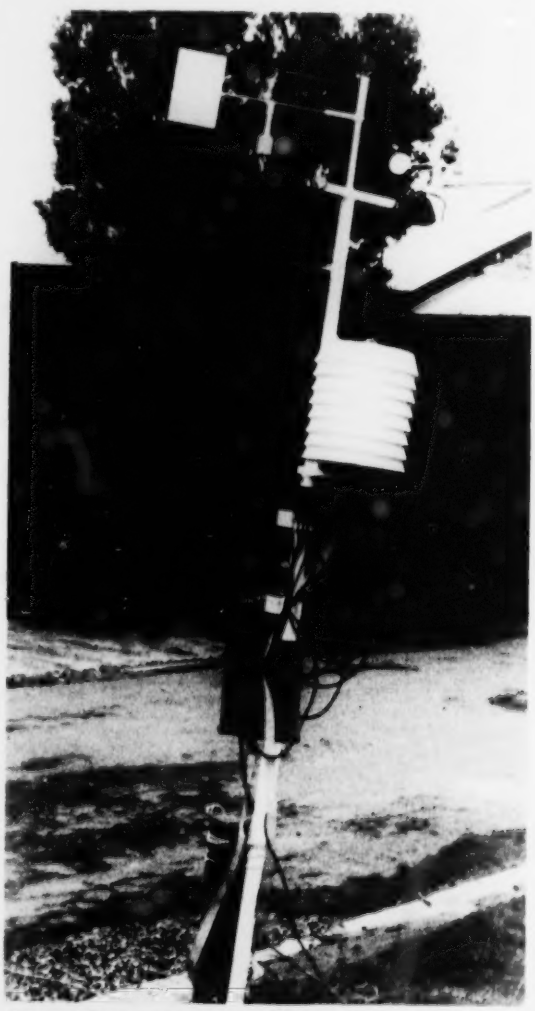
At present

Each school at the present time is becoming more familiar with the equipment that has arrived. They are producing materials that have to be passed on to the next school which can evaluate the information. This is not a rapid process and is slowed up by the demands of schools at this time of the year. It will be some time before the materials produce any major changes to the school's curriculum, but some programs are expected to be in place in the school early in 1989. More effects will be felt in 1990 at the same time as the VCE comes into being in full. The development of curriculum materials for the VCE ought to be better done because of the work and communication that resulted from the development of the Environmental Science Tekpak.

Into the future

The future of this work will depend upon the staffs continuing on from where they are at present and maintaining the communication links. The work done by this group has benefited the schools and should further benefit them in the difficult time ahead. It has depended in the past on teachers working in their own time and this will be even more true in the future.

If you you would like to know more about this project, please contact the Heytesbury Cluster and we shall make every effort to answer your questions or show you the work we have done.



Part of the Environmental Science Tekpak, an automatic- recording weather station.

A Satellites Tekpak

In the South Gippsland Cluster
By Don Patterson and Joan Wallis

Students are highly motivated when they are involved in using this increasingly important service — the reception of data from satellites. The equipment required to receive transmission can be purchased for under $2000 and the data can be recorded on an ordinary cassette recorder, and checked and decoded on a computer. The sharing of the reception equipment — the Tekpak — between the schools of the cluster is aimed at giving students who are doing a science/technology course an understanding of satellites, and encourage careers in that field.

Recent moves by the Commonwealth Government to increase Australia's participation in satellite technology ensure that satellite studies will remain topical, relevant and attractive to our students. Students are keen to be involved in using this increasingly important technology because they can see its impact on their everyday lives– in news preparation and overseas sports coverage, weather forecasting and navigation.

Which satellites?

Of the thousands of satellites circling above us, several are accessible by and of interest to school students. In particular:

- UoSat 1 and UoSat 2 — designed and built at the University of Surrey, England with the express purpose of stimulating a greater degree of interest in space science in schools by the active participation of students.
- NOAA, OSCAR etc.— low orbit weather and amateur satellites.

Although the equipment required to receive information from the satellites can be purchased for under $2000, such amounts of money are not readily available in a small country High School. The formation of the South Gippsland cluster and the encouragement to develop tekpaks under Resource Agreement 3 funding has enabled this project to go ahead.

What do they transmit?

The UoSat satellites each pass overhead about six times daily and as they go over they send down large amounts of data. Included in the data are

- news bulletins about satellite technology
- measurements of the current state of the satellite e.g. battery currents and voltages, temperatures
- specified data relating to the earth's magnetic field, the sun's radiation and the satellite's environment collected during one complete orbit (whole orbit data).

The (satellite's) data can be recorded on an ordinary cassette recorder and later checked and decoded on a computer.

What can be done with the data?

The data can be recorded on an ordinary cassette recorder and later checked and decoded on a computer. Students can use the data in various ways, for example to

- determine the motion of the satellite (e.g. its spin rate or rate of rotation about the earth)
- find out how electrical energy is obtained and distributed throughout the satellite
- correlate the sun's radiation levels with radio reception.

It is envisaged that this data could be used with the VCE physics course experimental investigations and projects, especially:

- unit 2, topic 1 space travel
- unit 3, topic 2 electronics
- unit 4, topic 1 satellites, planets, moons and stars.

What equipment is necessary?

The tekpak consists of:

- a VHF/UHF receiver to receive the satellite signals
- a cassette recorder to record the tones put out by the receiver
- a demodulator for changing the tones into signals suitable for a computer to read
- software for predicting when the satellite will be overhead and for decoding the data that has been transmitted
- teacher reference material consisting of satellite technical manuals, space science and mathematics reference books, CSIRO Office of Space Science A/V pack
- a secure container is provided for transport.

The sharing of the tekpak between the schools of the cluster will give students following a science/technology course an understanding of satellites and perhaps encourage a few to follow a career in that field.

Don Patterson teaches physics and mathematics at Korumburra High School. Joan Wallis is the co-ordinator for RA3 activities in the South Gippsland Cluster. Don and Joan had organised an in-service to familiarise the teachers of the cluster with the tekpak when it was stolen along with other technical equipment from KHS. When the equipment is replaced trials which had commenced will be completed.

LOTE Distance Education

In the Wimmera

By Hansjörg Behrendt

The Wimmera Community Languages Program supports LOTE education in a wide area around Horsham. The operation of the WCLP is examined in terms of general models for using distance education technology to support LOTE in schools. The use of communication technology takes distance education toward a more student centered approach. Communication should ideally be in the target language. The article analyses the teaching techniques involved, and examines the demands, which can be considerable, on teacher planning and organisational skills.

When you talk about Languages Other Than English (LOTE) and distance education (DE) you have to widen your perspective to the state and the national level. The Wimmera Community Language Program (WCLP) in the Horsham School Support Centre is a community/foreign language resource centre and carries out multiple tasks for the Region and beyond, but I would like to concentrate on the DE aspect only here.

In the Wimmera Community Language Program we teach:

- 20 LOTE lessons a week using DE equipment, all 20 lessons on the Duct, using the facsimile machine frequently, employing the Macintosh about 4 to 5 times a week;
- German, Italian, French (soon Japanese);
- Hub-teacher (where the teacher gives lessons to groups of students at remote locations) as well as Hub-class lessons (where some students are on site with the teacher while the rest of the class are at a distance);
- an age range between about 6 and 40 years;
- community members, School Support Centre staff and teachers how to use the equipment;
- German conversation for teachers, using a teleconferencing bridge.

The history of the project

When I came to the WCLP as a technological ITF greenhorn in July 1988, quite a few people were using the Mac-Fax-Duct link in other subject areas. Distance modes of education presently seem to be operating on one of the forefronts of innovation and school improvement, and the WCLP is the only program so far in Victoria to use new technology in LOTE on a larger scale. I have always looked forward to meeting other LOTE teachers at inservice activities, but hardly anybody ever turned up apart from me and the Italian and French sessional staff that we employ in the Wimmera. As far as LOTE was concerned, I had to rely on my exchange partner's hints or I had to turn elsewhere when I thought I was running out of creativity myself.

When I started working in July, I was very impressed by the user-friendliness of the equipment. Until November I only used the Duct (voice link) and the Fax (document link). After having been shown how to throw the switches and push the proper buttons, I was left alone and to my own resources, with very few lines to read about what motivational, psychological or linguistic effect would be produced if I used a certain approach. Of course, all of this was very challenging, even appealing to my individual way of dealing with problems, but before every single Duct lesson for the next one and a half months I found myself with the same clot in my stomach as twenty years ago in my first teaching practicum as a student.

From this experience follows my recommendation that it is absolutely imperative

Many questions were raised . . . that come up again and again when teachers are introduced to the DE delivery mode, the main one being that for 'identifiable skills' for the DE teacher.

to inservice teachers who will be teaching in the DE mode. Furthermore, no student teacher should graduate without training on DE technology and DE teaching methodology.

I was fortunate, at a fairly early stage, to get initial inservice support from people in the RA3 Advisory Committee, first of all Barry Sproull, then Jeff Woolhouse and Ivan Margitta, later Neil Elliott. My single most important aim at the Whiskers (What's Happening In Supporting Kid's Education in Rural Schools) Conference was making contact with experts who had done it in LOTE – but no one had, although experts abounded. So the most important workshop I attended was 'Aspects of Voice Only Communication', done by somebody who knew his business as an actor, former DJ and radio moderator. The second, most valuable remainder of Whiskers was Russ Healey's unpublished manuscript Teleconferencing, Humanizing and Teaching Strategies, a paper that draws heavily on the American/Canadian DE experience, very similar to the very recommendable, because highly analytical and soundly researched report by Pam Birkett of the South Australian Correspondence School, which, I am sad to say, I received far too late.

Much more interesting, rewarding, motivating was the Debit (Distance Education By Interactive Telematics) inservice in December 1988, however disquieting it sometimes became for me, when I was referred to as an expert for LOTE DE. I felt - and feel — far from being one, I liked the well-planned hands-on activities and tremendously enjoyed analysing the main didactic-methodic problem: how can communicative (foreign) language teaching be achieved through the Mac-Fax-Duct link? Does the language not lose appeal, impact, motivation? Can the 'equity of student outcome', a level of proficiency in the LOTE, be reached that is comparable to classroom teaching? Many questions were raised there, that come up again and again when teachers are introduced to the DE delivery mode, the main one being that for 'identifiable skills' for the DE teacher. The answer is so simple, I hesitate to give it: be a good teacher, one who knows his tools, one who can plan, conduct and analyse (stimulating) learning, one who is a good communicator, and finally, one who is exceptionally well prepared.

Victorian and Interstate cooperation

For about four months I had been of the opinion that Victoria was the only State on this forefront of educational improvement, until I contacted Paul Rixon from the Learning Communication Systems Unit (LCSU) in Adelaide. It was quite thrilling to find out that South Australia was in no way behind, but had partly originated the development that telematics has taken in Victoria. It was immensely beneficial to have Paul Rixon as a guide, because he knew the teachers actually operating LOTE programs on the Duct. I could exchange ideas with teachers from Adelaide High School, especially German teacher Pat Petronio, who had taught in the Hub-class situation for almost a year and was not very positive about the setup although all exterior conditions were very favorable (equipment stationary in the classroom, a technical aide to help when things went wrong, logistic help and new technical developments from the LCSU).

I was also able to meet German teacher Margret Scheil at the SA Correspondence School, where a lot of LOTE is delivered very successfully through the Duct. Margret is a very committed distance teacher and has developed earlier material and ideas by Sylvan Talbot and Friedrich Woerner to be used in teaching the course Deutsch konkret on the Duct in the Hub-teacher situation.

Administrators and practitioners of all States took part in the National Distance Education – LOTE Conference in Adelaide in February 1989. A tremendous amount of fast and concentrated work was put in by participants and organizers (ASLLP) to develop a National Action Plan and to identify the most urgent issues to be tackled - cooperatively - by the individual States. I recommend reading the whole report compiled by ASLLP's organizer Lorraine Pulsford.

It may have taken some time in that 'learning by doing' phase last year, to avoid making gross mistakes like asking an open question without a name tag to the other end (I always have more than one student at the other end!), or overestimating the students' concentration span.

(The lack of the visual element) leads to the reduced spontaneity and relative inflexibility in the teaching process which needs to be accounted for by a rather intensive preparation — roughly 2 to 3 times the normal.

The lack of visual information in distance education

The biggest single concern has been, and will be the relative lack of the visual element in the distance classroom situation. We go to great lengths to accommodate for this deficiency, and certainly the facsimile machine can be very helpful. The teacher may send visual material that will be used in listening, speaking, reading or writing exercises. The teacher can fax any kind of worksheet or test, this then to be copied for the number of students in the distance class, to be completed by students and then faxed back to the teacher for correction.

Basically, it is the same cybernetic input and output model as in any other classroom situation, just hampered by a few detours and the lack of the face-to-face relationship that can make all the difference. It leads to the reduced spontaneity and relative inflexibility in the teaching process which needs to be accounted for by a rather intensive preparation — roughly 2 to 3 times the normal. Telematics teaching still seems to be cost effective — if something like that can exist in education.

Because of this visual lack, distance education will always be second best. There is no doubt about it. However, it is also quite evident that it is 100% better than having no instruction in the language at all, and probably 50% better than having correspondence print only materials.

The aim of communicative competence can only be reached in an interactive, communicative teaching model classroom. It focuses on the four main skills in communication (in order): listening, speaking, reading and writing. The communicative aspect also takes it towards a more student centered approach, and the means of communication in the classroom should ideally be the target language. These concepts are the foundations of modern language instruction.

The organisational variables of the distance education classroom include the Hub-teacher situation, the Hub-class situation and the multi-point situation.

The difficult conditions under which I had to trial the Hub-class situation for one term in 1989 rule out any conclusive evaluation on my part. I felt not very much at ease in the situation and I doubt that I ever will, although I normally thrive on face-to-face classroom situations. I would consider the following the ideal layout for a LOTE Hub-class:

Italian class at Edenhope High School — 96 kilometres from the other class at Horsham.

- the classroom layout is a horseshoe;
- the Duct link, and the facsimile machine connections, are firmly installed, the microphone leads are long enough and pinned to the ground (Alternative – a teacher aid sets up the equipment well before the lessons. It is absolutely imperative that all equipment is stationary in the classroom, set up and switched on before the lesson bell goes. You need five power points in the classroom, six if you have planned to use the tape recorder. A cable tunnel in the ground would not be a bad idea!)
- With the Macintosh used as an interactive electronic blackboard, if the Hub-class has more than four students, a Datashow is essential ;

I found this teaching situation – 17 year 8's in front of me, 6 at the other end – nauseatingly strenuous, so please read Pat Patronio's report for a more positive evaluation of this setup.

I am just presently trying to trial the multi-point situation, and so far the levelling and clarifying effect of the teleconferencing bridge is indeed very helpful in teleconferencing through the Duct system. At the moment it is not foreseeable that the teleconferencing bridge will be used for full-fledged classroom teaching. Its main use will probably be for networking (especially for the VCE) and holding inservices for teachers, SSC staff and community groups, including TAFE.

. . . using LOTE distance technology increases students' technological awareness as well as skills, especially with the increased responsibility of self-supervision at senior school level.

The demands on teacher's planning and organizational skills

A lot of material has been printed on the Hub-teacher situation, but this material is generally concerned with technology set-up or with non-subject-specific techniques and strategies of managing teleconferencing. The remarks of Christine EkinSmyth and Margret Sheil have been very helpful. I would like to add to the practical hints that I received from these two practitioners, and return to the question of identifiable teaching skills in DE LOTE to be incorporated in one's teaching repertoire.

The demand on the teacher's planning and organizational skills is considerable.

- Where is my lesson plan, including aims of lesson? In my mind or on paper?
- Have all students got course material?
- Have all students got a workbook or worksheets?
- Is there enough visual support material in the course book, workbook, or worksheet that teacher can refer to?
- Can I stay in the target language for the whole lesson? When not? Under what conditions will I speak English?
- Do the students need additional visual material?
- Do I need to send other advance material?
- Does the supervisor at the other end need a lesson plan (fax) or can he cope without one? (Be prepared for the supervisor to be ill!)
- Might there be any change in the timetable?
- Which phases of the lesson can the students do without me?
- Is there any way of incorporating more partner or group work?
- Have I limited my direct work with them in one medium to not more than 15 minutes (concentration span)?
- What equipment must I use to reach the lesson aims? Fax? Duct? Mac?
- It would be a progress to plan the allocation of time between Mac work and Duct (verbal) work.
- Is MacPaint really the best software to be used as a blackboard?
- Is the Mac link really necessary in this phase or can the same communicative aim be reached by the voice link only?
- Is it more cost effective to cut the lines during a group or partner work?
- Are there alternative ways to reach aims, when the voice link telephone lines are hopeless, when the Macintosh software plays up?
- Are the students familiar with the Mac-Fax-Duct and do they feel at ease using it? If not, can I employ any low risk activities to effect this ease?
- Be aware that using LOTE distance technology increases students' technological awareness as well as skills, especially with the increased responsibility of self-supervision at senior school level.

The demands on manipulative skills

Manipulative skills are needed whenever the teacher has to handle or adjust technological equipment.

- Operating guidelines for Macintosh, facsimile machine, Duct and bridge are at hand for quick reference if needed.
- Have I plugged in and switched on all appliances?
- Is the Duct 'tuned' properly to the other end?
- Have I set up my workplace in a way that I – cannot trip over leads or cables? have enough space to be able to write (on paper) and handle the print materials that the students work on? am close enough to the microphone/Duct unit? can use a mouse (or graphics tablet) easily?
- Have I got the right Mac application software handy? Remember, for Intermac the two sites must have exactly the same software.
- Am I really using the most comfortable amplification system for my present workplace (loud speaking telephone, Duct inbuilt speaker, external speaker)?
- Am I fully aware of what I can do with the software applications, e.g. MacPaint? Do I feel comfortable with it?
- Who is my 'backup' when I run into problems, i.e. who is the expert here and can help me quickly?

Since (Aural/oral skill) are the main medium of communication, it will subsequently not only be the best developed skill in students, but it initially puts most stress and strain on all participants in the distance education process.

Providing visual clues

- According to my lesson aims and the appropriate lesson phase, in order to perform the language activity do the students need – verbal clues? image clues? numerical clues?
- Reference to course book, workbook or faxed material?
- Have I numbered all the pictures on the worksheet so I can use them as flash-card substitutes ?
- Can I use the Mac to provide the clues?
- Can I prepare some lessons in advance, using Macpix or other software to accommodate my lesson aims? If so, must I duplicate the disk and send it to the students, or is there another way of sending it?
- Can I, need I, provide posters, pictures, wall charts, displays, slides, videos to enhance comprehension or to to further skills?
- Invicon booth: am I using this expensive equipment to its full advantage to provide students with substitute visuals?

Starting the lesson (lesson management skills)

- I should be in the right frame of mind for the target language!
- Have I prepared a list of expected participants (class list)?

  (This list is to serve throughout the lesson as a checklist for who I have asked [tick] or who has contributed something [tick]. In this way I will never lose track of how often the individual at the other end takes part in the lesson)
- Have I ascertained attendance (and reasons for non-attendance) in the target language?
- Have I told the students that I hear them clearly, do they hear me?
- Have I welcomed everybody to the lesson ? (A genuine communicative activity to establish rapport between you and the students and setting the target language environment)
- Can I find an interesting conversational start of the lesson that fills a genuine information gap? (the weather, last night's TV programme)
- Do I have to establish rules for listening, responding, questioning and other interaction, or have I already done this in the previous lessons?
- Do I use classroom phrases that the students are familiar with?
- Do I have to teach them additional classroom language as to enable them to handle all tasks, receptive and productive, in the target language?

Aural/oral skill

Since these are the main medium of communication, it will subsequently not only be the best developed skill in students, but it initially puts most stress and strain on all participants in the distance education process.

- Can I (and the students) endure the interferences in the telephone line, or do I have to initiate a hang-up and re-dial procedure?
- When clipping occurs, blame the Duct or Telecom, never blame the kids!
- Am I patient and reassuring? Waiting for an answer can be a skill.
- Do I anticipate or react quickly to any concentration span limitations?
- Am I practicing sufficient anticipatory listening skills in order to be able to understand faulty or clipped verbal utterings? (Intelligent guessing is very important for teachers, not only for students).
- Am I practising sufficient phonological (pronunciation and intonation) fault tolerance? Or do I butt in too quickly to correct the students. If intonation or pronunciation are not the objectives, then no corrections!
- Do I allow sufficient time for pauses (especially when using the Duct in a language laboratory fashion)?
- Do I speak clearly? Sufficiently clearly to encourage imitation?
- If clipping seems to be particularly bad, do I remember to 'Bob Hawke'? Start speaking with "Aaa ...", "Ahem ..." or similar vocal noises that activate the voice switch in the Duct.

Student-teacher, student-student interaction

- How can I encourage interaction in the group?
- Are there any low risk personal activities I can initiate?
- Do I make everybody participate?
- Do I make sure of feedback from everybody (even if unpleasant)?

- Have I encouraged and trained students to verbalise what I cannot see in the group at the other end, what other students are doing (if they are not speaking or making other noises, e.g.'Sean is thinking', 'Yes, he's found it, and he'll tell you in a second')
- I should use gesturing and facial expression in front of the microphone. This affects the timbre of my voice and will reach the students at the other end.
- Do I encourage students to ask questions?
- Do I encourage them to voice apprehension or feelings of insecurity?
- Do I ever get impatient? authoritative? bossy? intimidating?
- Do I let my personality come through, and do I encourage students to let their personality come through?
- Am I using diversified re-enforcement strategies?
- Can I 'pass the buck' to students, or do I have to prove my competence by answering every little question myself?
- Have I learnt to react quickly when I feel (or students tell me) that I am too dominating.
- Have I got a sufficient number of interactive, task centered techniques at hand that I can throw in when the need arises: teacherless tasks, games, role plays, partner – group work, discussion topics?
- Can the supervisor at the other site help in creating interaction? In any case she/he should never be a passive classroom member.

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French class at Ararat High School. Oral reading practice with Year 11 Correspondence students at Nhill Secondary College — teacher Jenny Wilson.

Jörg Behrendt came to Victoria from Germany on an International Teaching Fellowship on a one year exchange. The Wimmera Community Languages Program had been operating for several years, providing a service to local schools in a mixture of modes, visits to schools and distance education technology lessons using the Duct and facsimile transmission.

Jörg settled quickly into his exchange position. It is to be remembered that apart from having to communicate much of the time in a 'second' language, English, he had to come to grips with the concept of 'distance education' – distances between schools in Germany do not compare to those found in Victoria's Wimmera region. Nor could Jörg claim any initial expertise with communications and computer equipment, this kind of technology being very rare in German schools.

By the time Jörg left in July 1989 his personal achievements included:

- *a great contribution to the education of students in the Wimmera – his enthusiasm for the work is demonstrated by the number of classes he was persuaded to take on a regular basis;*
- *a valued contribution to the formation of a national policy on LOTE education;*
- *the development of techniques for using the Mac-fax-Duct technology to facilitate LOTE distance education teaching to the extent he was several times used as the 'expert' during inservice training for Victorian teachers.*

He is remembered fondly by all those with whom he came into contact, participants in RA3: students, teachers and administrators.

Teaching and Distance Education

By Jill Parker

The following notes refer to the use of Macintosh computers and other equipment as purchased under the Resource Agreement, including Intermac.

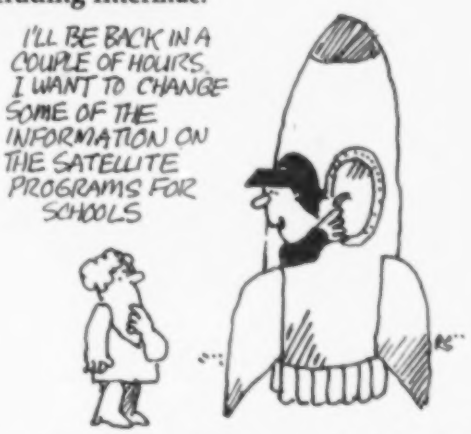
There are many things that go through your mind when you discover that some of your class are to be many kilometres from you and the rest of the students. The main thing is don't panic. Teaching students at a remote location need not be terrifying or difficult provided you follow a few basic rules.

Rule One: Familiarise yourself with the software that you will be using during class time

Normally you will use either MacWrite or SuperPaint software. Both of these packages are user friendly, and quickly grasped – especially the main operations and features. However, take some time to become confident in the use of these programs.

If you are using SuperPaint you will probably use a Graphics Tablet instead of the Mouse. This again is not difficult, although some practice with the use of the Graphics pen is in order if you want to make the most of your space on the computer screen.

When using the Graphics Tablet and pen, it is necessary to first move to the apple on the top left hand corner of the screen and select the Control Panel under it. Make sure that the computer is switched to the Pen rather than the Mouse. The Pen and Mouse can both be used in this mode via a Mouse attachment at the back of the Graphics Tablet.



Rule two: Don't be frightened off by the technology

The only thing you need to be able to operate is the telephone.

Make sure that the communications application is on the disk that you are going to use in the class.

The first link to make is the verbal link with the other location, that is ring them on the Duct telephone or answer their call to you. Then, if you have any worries, you can be 'talked' through the procedure by someone who is familiar with it.

Rule three: Make face-to-face contact with all the members of the class before classes commence if possible

It is much easier for everyone involved if they know the 'face' that goes with the voice they hear. And interaction is much easier between people who have met each other on a prior occasion. It is also important for the students to meet each other so that they belong to the class as a whole, and not just to part of it.

If physical meeting is not possible, then some time to become familiar with one another using the communication link-up is necessary (one or more 'getting to know you sessions').

Make sure that you involve each student by directing questions to individual students, and asking different students to comment ...

Rule four: Arrange the audio contact so that each class member can hear everyone else in the class

This may seem unimportant, but in a normal class visible and audio contact occur at all times. Students hear other students' questions, answers, and reactions to the teacher; and student discussion is important in many aspects of their work. Therefore it is vital that students at different locations can interact freely with both their teacher and their classmates.

Rule five: Make sure that all students are actively involved in the class

In a normal classroom, it is easy to see if a student is working or looking confused or bored. At another location this observation is not as easy!

Make sure that you involve each student by directing questions to individual students, and asking different students to comment on or amend statements and answers given (if appropriate). Also make sure that your questions can't always be answered by a simple 'yes' or 'no'. Such an answer does not reveal much about the depth of a student's understanding of the problem.

Using students' names when asking questions keeps all students involved in the work (hopefully).

Rule six: Make use of all of the equipment available to you

Fax machine. Material to be read, discussed or answered in writing by the students, work sheets, assignments, homework tasks, etc. can be faxed to remote students before, during, or after the class as appropriate.

Computer and modem can be used during the class in place of a chalk board. What you type, write or draw onto your screen will appear immediately on the screen of your students. Similarly, what they write to you will immediately appear on both screens. Material on the screen can be altered, or added to, or removed as you wish.

Only one person can use the screen at once. The person 'in control' of the screen will have a solid cursor on their screen. All other cursors will appear as shadows. When the screen is 'not in use' another person may take charge of the Mouse or Pen.

Duct audio system allows constant audio link-up between members of the class. Again, only one person may speak at once, and the loudest voice will take control.

The audio connection is possibly the most important aspect of distance education. But on its own it does not provide a completely satisfactory contact with your remote students. There are times when you want to see their work as well as hear their answers and problems.

By making full use of the duct, computer and fax machine the only thing missing from your lesson may be the faces of your students!

The telematics room at Casterton High School.

The main thing is don't panic. Teaching students at a remote location need not be terrifying or difficult.

Procedures for Use of the Communications Equipment

1. Make sure that you have the communications application on your disk. If you don't know how to do this follow the instructions that go with the software, or ask someone to do it for you!
2. Make sure that each piece of equipment needed is connected up and turned on.

   You will need—

   (i) Fax (which will be on anyway!)

   (ii) Duct. Switch on at the wall and at the unit.

   (iii) Modem. Switch on at the wall and at the back of the modem.

   (iv) Computer. Again make sure that it is on at the wall and at the back of the computer.
3. Phone the remote location, or await their link-up with you, on the Duct phone.

   When audio contact has been made, switch the Duct to 'Line On' and then replace the telephone receiver. From now on, the voice of the other participants will be heard through the loud speaker, and you will use the microphone to speak to them.
4. Put your application disk into the computer and call up the program you are going to work with (MacWrite or SuperPaint). Instruct the other participants to do the same.

   When you have an empty screen, move to the apple in the top left hand corner of the screen. Pull down to 'Intermac' and release the mouse button. Make sure that the others do the same.

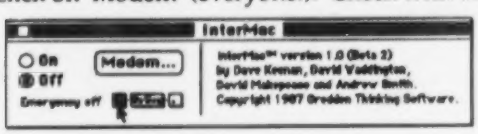
   A dialogue box appears on the screen. Double click on 'Modem' (everyone!). Check with the person(s) at the remote terminal to make sure that you have both computers set up similarly.

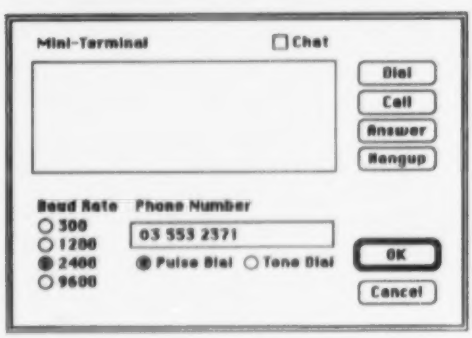
   Enter the telephone number that you are going to dial and then click on 'Dial'.

   When the computers have linked, 'Connect' or 'f' will appear on the screen. Both locations should now click on 'OK'.

   When back at the original dialogue box, both locations click on 'On'. Then either one of you may click in the top left hand square of the dialogue box to 'put it away'.

   You are now ready to start working on the screen.





At the end of the lesson

1. Move to the apple at the top left hand corner of the screen. Pull down to 'Intermac' and release the mouse button.
2. Click on 'Off'.
3. Both locations will now have to double click on 'Modem', and click on 'Hang up'.
4. Close both dialogue boxes.
5. Quit the program.
6. Turn the modem and the computer off.
7. Switch the Duct to 'Line off', then switch the power off.
8. Make sure that all equipment is turned off (except the fax machine).

Jill Parker is a teacher of Biology, Ag. Science, Computer Studies and Mathematics at Mortlake High School. Residing on a sheep property, a mother of three, Jill Parker resumed teaching in 1985. Strongest interests are agriculture and computers. Jill has been involved with RA3 since its conception, and among other activities, has assisted in the development of the RA3's Inclusive Curriculum Tekpak.

Using Communication Technology

in the Shire of Mildura Post-primary Schools Cluster
By Pat Sutton.

The concept of clustering and the use of distance education technology was accepted as a means of widening the curriculum offerings of post-primary schools in the Shire of Mildura. This article reports on the process within the Cluster of trying out the technology and on progress made.

The Shire of Mildura Post-primary Schools Cluster comprises Irymple Technical School, Merbein High School, Red Cliffs High School and Werrimull Consolidated School. The first three of these are located within 15 kilometres of Mildura while Werrimull is approximately 70 kilometres west of Mildura.

All four schools are relatively small. Details of student numbers and the year 12 subjects run at each school in 1988 are as follows:

School	*Population*	*Year 12 subjects.*
Irymple Tech.	406	14 Group 1
		10 Group 2
Merbein High	225	17 Group 1
Red Cliffs High	467	14 Group 1
		10 Group 2
Werrimull Cons.	59	5 Group 1

Reorganisation meetings involving all government post-primary schools in the Mildura area have been taking place since 1984. As the discussions progressed it became obvious that Mildura High School and Mildura Technical School, the two largest schools and located adjacent to each other, were developing a combined year 12 program without reference to the other schools. Because of this the other schools, which now comprise the Cluster, began examining ways in which they could extend or broaden their offerings to senior students from within their own resources. The issue of wider student choice had also been raised at sub-Region wide inservice activity days and in other forums during 1985 and 1986.

The procedure

Meetings of the Mildura Shire Post Primary Schools Cluster, involving the Principal and one or two staff from each school, have been taking place since Term 3 1986.

One outcome was that Red Cliffs High School and Irymple Technical School established a system of resource sharing for Year 12 Chemistry and Year 12 Computer Science in 1987 and for Catering, Chemistry, Data Processing and Maths B in 1988. A system of taxi transport is used to ferry students to either campus for lessons.

Meanwhile, meetings of the Cluster researched subject offerings and retention rates in member schools and attempted to identify needs which would be addressed by using appropriate technology. Neil Elliott, Bendigo Resource Centre, accepted invitations to address Cluster meetings in 1986 and 1987 on the concept of distance education. The Cluster applied for a Resource Agreement seeding grant in December 1986. Two small grants were received—in Term 1 and Term 3 1987. In May 1987 one representative from each school travelled to the Bendigo Resource Centre to undertake some evaluation of the equipment there as to its appropriateness for our purpose. A submission for loan of similar equipment was made to the Resource Agreement in June and the trial equipment began arriving in schools at the beginning of Term 4 1987. Initial trialling proved to be sufficiently encouraging for a Working Party to be formed to write a submission for similar equipment to be supplied to schools within the Cluster on a permanent basis.

The equipment consists of three components—the audio link, the document link, and the visual link....Subjects trialled so far include Accounting, Biology, Economics, Graphics, Physics and Music.

The equipment

The equipment consists of three components—the audio link, the document link, and the visual link.

The audio link is provided by a Duct communication terminal, with microphones, attached to an individual telephone line. A bridge, located at one of the locations, allows for multi-point contact. The document link comprises a facsimile machine attached to an individual telephone line. The visual link is provided by Apple Macintosh computers, with appropriate software, printer, modem, graphics tablet, scanner, and Datashow liquid crystal display (LCD) units for overhead projection.

One Invicon Booth has also been supplied to the Cluster. The booth will allow three dimensional images (solid objects, writing, a teacher demonstrating) to be video-taped. Videos made in the booth could then be posted to the appropriate location.

The project required renovations to be made at each school including the provision of three telephone points, electrical work, carpets and drapes.

Trialling in 1987-8

Each school in the Cluster received a Macintosh Plus computer and software, Imagewriter 2 printer, a Netcomm modem, a Ricoh Fax machine, and a Duct in Term 4 1987. One or more teachers in each school familiarised themselves with the equipment and trialling began early in the term.

Trialling has been delayed by the slowness in provision of the equipment and the development of suitable software. However, small group trialling with reduced classes of up to three, going point to point, has been done with some promising results. Subjects trialled so far include Accounting, Biology, Economics, Graphics, Physics and Music. We had hoped to trial with larger groups and in a wider range of subjects (for example the classes shared by Red Cliffs and Irymple have a minimum of seven students at any particular location in these groups) but were limited in not having additional Macintosh computers, and until recently, multi-point and overhead display facilities.

The Macintosh computers have a high degree of user friendliness which has encouraged staff to prepare and plan lessons using the many valuable tools made available in various Macintosh software. Other uses have also been developed including use in school administration (using Fax, Mac and Duct), Cluster committee meetings, teacher exchange of resources, VCAB meetings, and adult education night classes.

By the end of Term 3 1988 10 teachers in the Cluster had had intensive inservice training in the full system, 38 staff had developed 'Mac literacy', and 62 students had been involved in the project.

During 1988 Mal Phillips, Red Cliffs High School, was appointed three days a week as a consultant to the Cluster. His being able to devote so much time to the project has been invaluable.

... we don't anticipate the process of aligning four timetables to be an easy one.

Outlook for 1989

Timetabling considerations are being studied in Term 4 1988 to enable decisions to be made in the light of subject offerings and student choices for 1989. There has already been some timetable alignment with the Red Cliffs and Irymple locations in 1988 but we don't anticipate the process of aligning four timetables to be an easy one.

However we expect to be able to identify the subjects to be amalgamated in Term 4 and provide intensive inservice training for the staff and students likely to be involved before the start of 1989. Most of this inservice training will be within the Cluster but some staff from each school will be attending the Distance Education By Interactive Telematics (DEBIT) Conference in Bendigo in December.

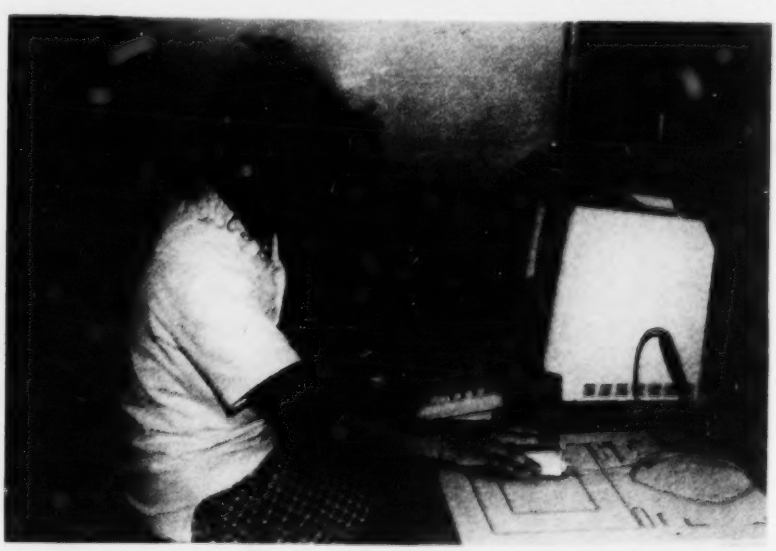
We are optimistic that the system will be used on a timetabled basis within the Cluster in 1989. The Fax, Duct and Invicon systems are now dependable. However, a number of problems must be addressed.

If the system is to be used as envisaged by us we must have additional terminals and multi-point facilities. At present there are three computers at each location. On some occasions we will want to link a group of one or two students at one location with a similar number at another location(s) and the terminals we have at present would be sufficient. At other times we would like to link the small class with a larger one (perhaps up to 10 students) and more terminals will be needed at the location with the larger class if all students involved are to interact.

Use of the Macintosh will also depend on the quality of the software used to link the schools. We were initially provided with 'Intermac' and the expectation was that an improved version or an alternative program, Sideband, would be available later in 1987. Unfortunately it has taken much longer and it is likely that we will only be able to use Intermac in 1989. This will limit us to linking two schools only at a time. Hopefully the version of Intermac available for 1989 will be error free.

Originally we applied for a full time consultant for 1988 with the position to be reviewed at the end of the year. Delays in getting the hardware and the development of Intermac and Sideband have resulted in our not making as much progress as we had hoped. The role of consultant has been crucial to the progress of the Cluster in 1989 and we consider it important that it be extended for a further year.

Pat Sutton, a Senior Teacher, has been at Merbein High School since 1972. He has been associated with telematics within the Shire of Mildura Post-primary School Cluster since the Cluster first began investigating the appropriateness of technology for its needs. During 1989 Pat is teaching Economics to year 12 students across the Cluster partly by using telematics, and has trialled telematics in Accounting.



The Bal-Cas Music Program:
making music in the Far West Cluster

By Barbara Lipscombe

The Bal-Cas Music Program links two sites, Balmoral and Casterton. The schools, supported by the Correspondence School, are developing a self-paced, computer aided course which operates from year 8 to 12. The major trust is to offer music at year 12 (VCE Music in Society) using telematics in towns with no qualified music teacher. Students and parents have indicated early approval of both the course and the delivery modes.

Three years ago the number one priority at School Council level was for the provision of music education.

Concepts

The Bal-Cas Music Program is constructed to address the shortage of music teachers across the State and in particular the inability of small rural post-primary schools to attract the existing trained music teachers away from the metropolitan area and the larger regional centres.

It relies on

- self-paced, interactive computer programs for keyboarding
- individually operated video making booth
- graded program of music pieces for practical keyboarding
- needs based theory support program using a reference collection, indexed computer program and sequencer diskettes
- self-paced, interactive computer program for training and sight singing
- computer-aided music composition programs

Thus this program requires a facilitating interested teacher rather than qualified music teacher. The program is currently being trialled years 8-11, with immediate plans to extend to year 12.

The VCE music program requires real time external expertise and support. At year 11 this support uses Duct, fax, interactive computers, sound disc exchange, video tapes and links with the Correspondence School.

Former Minister for Education, Caroline Hogg, participating in a split-site music lesson, with Barbara and Casterton students. Observers, members of RA3 Advisory Committee and Ministerial advisors crowd into a Music and Technology room which used to be a laundry.

The ultimate goal here is for students to select a sound or sounds that suit their interpretation of their graded pieces and record them as such.

Curriculum content and skills progression

The central element around which the course is developed is performance work on an electronic keyboard.

Keyboard Work

Pieces are graded (in progressive books) from the first five notes to a four octave range - from pieces in C Major, to G Major, to F Major and so on — from 4/4 to 3/4 time and so on. Students also work on the Keyboard Fundamentals computer program supported by a student work book. The student work books relate to each of the 15 lessons — giving aims, tasks, scores and comments gained and revision questions for each lesson. Lessons range from:

- The First Five Notes to Tunes for Both Hands to Rhythmic Precision to Rests;
- Whole, Half and Quarter to Scale Structures to Eighth and Sixteenth Rests to Time Signatures.

A further diskette program allows students to play one part or the other along with a prerecorded version of set works.

Theory

Theory is undertaken on a needs basis — each new piece attempted is analysed by the student for the following information: composer, key signature, scale, time and terms used. This information, including researched definitions of terms used, is recorded in the student journal.

The basic theory computer program is used in a cross-referenced way to support students initially. It will also be used in a lesson by lesson way that the Keyboard Fundamentals Program is formatted (when the student note book has been developed).

Students also use interactive diskette programs for the synthesizer, sequencer – these programs are marvellous for working with chords – students are assessed by the program recognising chords by name, by notes or by sound.

These diskette programs cover

- Ear Training Through Chords
- Chord Dictionary
- Chord Treasure
- Rhythm Games
- Melody Games
- Orchestration 1
- Basic Instrumentation
- Playing the Blues

Ear training and sight-singing

Sample diskettes have been made for all of the graded pieces. Students listen to pieces played at real pace and then slowed to beginner pace (without loss of pitch) before they play them. From the very first day they start to identify incorrect notes and discords in their own playing. Early in the Basic Keyboard Interaction computer course students work exercises in identifying notes and intervals by sound.

An ear training and sight-singing interactive computer program builds on this early introduction and includes student vocal work in a number of voice ranges.

Simple diskettes have been made to illustrate basic terms relating to the pace of music and recognising 2/4, 3/4 and 4/4 time.

Music Appreciation

This area is somewhat in its infancy — the edition 4 Kamien tapes have only just arrived. These have been chosen because of the comprehensive notes in the main text book. These notes are sufficient to support a simple listening program at any level by a generalist teacher.

To date we have listened to prepared piano diskettes over a range of styles of music.

Each piece the student plays can be used as a basis for one to one discussion about style and interpretation.

Students listen to a whole range of instrumental sounds on the synthesizer it is here that their appreciation and creativity knows no bounds. The ultimate goal here is for students to select a sound or sounds that suit their interpretation of their graded pieces and record them as such.

Content, pace, goals are set for each student. What a wonderful opportunity to focus on the individual student!

Another project to develop a student's musical creativity is to record a sound backing for a fairy story, nursery rhyme, poem and an original piece by the student. Over this backing they then narrate and/or sing the words.

Currently a group of students is preparing backing music for the twelve songs in 'Man of Steel', Casterton's drama production for this year. Possibly a live performance or two coming up!

Multi-track recording

This facility is great – an individual student or a group of students are able to multi-track record any of their graded pieces or a piece of their own choice. Here they learn of the quantising function – and in a practical way improve their own time because the quantising only operates successfully within a limited 'margin of error'.

The Sound House has been a wonderful resource in this area of work.

Two excursions have been taken here — one in December '88 as a special and in June '89 as a part of a year 10 orientation week in Melbourne. Some students attended both and got such a lot from the visits. On their return they quickly tutored the other students.

Computerised music composition and scoring

The students have access to the Deluxe Music Construction Set program for the Macintosh computer. They may use either the computer keyboard or a midi controller keyboard to enter their work. A printout facility is available at Casterton and Balmoral. We also have access to the Cluster laser printer at Edenhope for really good quality hard copy production work.

VCE Music in Society

Currently the Correspondence School is linking one period a week to two year 11 students to extend this curriculum in the areas of Music History and listening. This will follow on to year 12 in 1990. Two of these students may link into a trained music teacher with similar equipment in the Heytesbury Cluster. New ground here, but I see lots of potential.

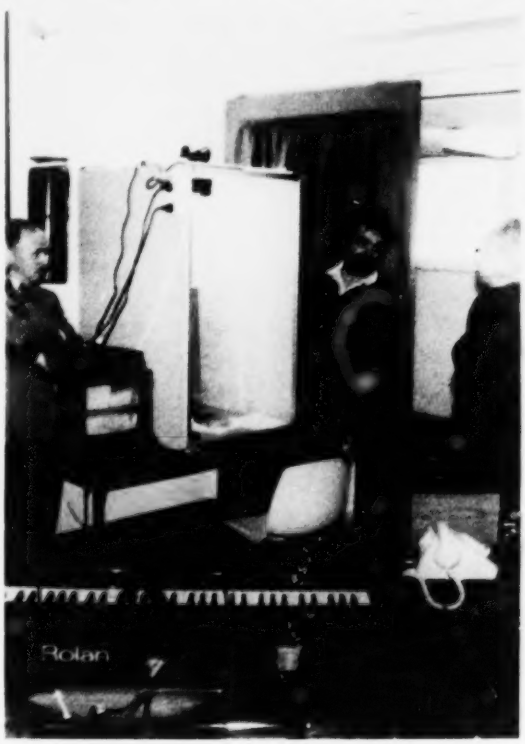
The Music in Society incorporates performance work. In towns with no private music teachers and no senior music program at the school students will have no access to VCE Music in Society Units.

Teacher role

The word here is facilitator. The up front task lies in management of rosters for using the various pieces of equipment. A wall chart works well — students can see at a glance when they will be using one or other pieces of equipment. The real task is to guide each student through the course, recognise point of readiness for a more advanced task, then to go back a step or consolidate a particular task. This is what good teachers do every day of the week in all subjects. I've found no trouble in applying these skills in an unfamiliar content area.

Content, pace, goals are set for each student. What a wonderful opportunity to focus on the individual student!

Of course a facilitating teacher would best have some background in music – a number of teachers have been taught piano and theory in their own school days. My own background is Intermediate Theory and appreciation in 1954 at University High School, taught by Miss Gwen



The Invicon booth being demonstrated by Neil Elliott.

Students really assess and then improve their performance pieces by recording, listening and re-recording. This happens frequently. Less frequently but increasingly, students are listening to and assessing other students.

Northey. In addition I taught myself to sight read and play the piano for my own pleasure (My own playing and confidence has much improved since facilitating this course).

What would a suitable facilitating teacher be like? I believe

- confident of their own ability to work with students on a one to one basis
- open with the students that they are facilitating rather than teaching
- value and appreciate music

(The art teacher is interested in joining me at Casterton)

Last July we started playing exercises. Gradually I introduced something new when I felt I had mastered the previous 'new' aspect. I've still got some to go.

Even if a beginning teacher were taking over the Bal-Cas program I would suggest, with new students, they introduce and try to use one aspect at a time. Ongoing students would know the ropes, continue at their own pace and be great tutors for both the teacher and new pupils. Many aspects were worked out by the students in the past twelve months then they taught me.

Assessment and the Invicon booth

Students are assessed on the following criteria

- demonstrating improvement in each of the areas of work
- completing agreed tasks.

For purposes of conforming with the middle school assessment policy students gain 1, 2 or 3 points — these are meant to relate to degree of difficulty. I think I'm getting better at relating degrees of difficulty for individual students.

An informal, but extremely valid assessment is student self evaluations. Students really assess and then improve their performance pieces by recording, listening and re-recording. This happens frequently. Less frequently but increasingly, students are listening to and assessing other students.

Note accuracy, time, and expression for performance work can be assessed

(i) by the facilitating teacher

(ii) from a recording by a local interested and knowledgeable person, or

(iii) from a recording by a music teacher elsewhere Correspondence or other school – possibly even a consultant in a School Support Centre.

How can technical performance be assessed? Fingering? Hand position? Posture?

The facilitating teacher may be able to help out. Alternatively the Invicon booth allows a student to make an overhead, sound video to show fingering and side on view to show hand position and posture. This video may be mailed for assessment to an external expert.

Crits of videos may be spoken, written, or in the case of the Correspondence School, replied to by another video made for that purpose to correct a particular fault.

The interactive computer programs score and crit each student as they use the program.

Curriculum materials used

Materials used include Xanadu and Roland computer programs, and school devised and commercially produced print materials. A detailed list is available on application from the author.

Facilities

Casterton High School is a typical 1950's building. We converted the laundry into a music room by out shifting troughs and washing machines, converting the hot boxes into a music store, providing carpet and wool curtains for the windows and installing two telephone lines.

Balmoral is a relatively new open plan school and the equipment has been included in a small, existing music room. The music room was, and still is, used one day a week by an instrumental teacher from Hamilton.

Each lab has

7 Roland HP 100 pianos
1 TL12 keyboard lab console
1 sequencer
1 synthesizer
1 IBM compatible computer
1 Invicon booth

and each school has an acoustic piano relocated to the Music & Technology room. Students love to play the piano when there are no classes in the M & T room or adjacent rooms. They have no trouble with different touch or key sizes.

The poor girls nearly died when they found 'Barb' to be middle aged, greying, plump and the authority figure in the school. For that day I was 'er um'.

Outcomes

- A happy band of motivated students undertaking music for the first time in many years at Casterton High School.
- An awareness of the whole school population of the scope of music (Lunch times – much to the horror of the duty staff – kids queue to use the room).
- Students who wish to have more than a broad introduction to music as general study to year 10 are able to do so. One year 10 student has signed into a double unit – 6 lessons a week instead of 3.
- A happy school community because music is available to their young people. Really this is what 'access and success' is all about.
- Casterton operates a vertical modular timetable for years 8 to 10. Years 11 and 12 relate vertically to the blocks for staffing purposes. As separate levels have not been designed the music classes mix and match and contain levels from 8 to 11. This facilitates beaut cross age tutoring – often the youngies tutoring oldies.
- Students may follow Music to VCE units.

Anecdotes

A distressed year 8 student was unable to re-sign into a Music & Technology unit for second semester. He came to me quite upset that the two classes he had tried to sign into were full. My solution — never mind, come to Extension Studies. Half an hour later — reply — Extension studies is only 1 lesson a week. Our solution — he would drop Phys Ed and Woodcraft and take up History and M & T where we had a vacancy. Result

- one happy student
- one flattered teacher

PS: He also negotiated to stay in Extension Studies.

Schools out west are rather formal and Christian names for teachers are not used, have never been a real issue. This year the three girls (years 9 + 10) were helped by a teacher at the Balmoral end to get used to the gear. Deb (the Balmoral teacher) and I used each others Christian names in the link up. When Deb stopped coming in the phone was still answered 'Hello, Barb'. Little notes came with their performance diskettes 'Dear Barb..'. One day Deb brought them down to meet the other students and me. The poor girls nearly died when they found 'Barb' to be middle aged, greying, plump and the authority figure in the school. For that day I was 'er um'. On the next phone line we soon settled back to our really beaut working relationship we had established previously.

Not long ago, whilst engrossed in talking on the phone link, I heard fingers clicking – our protocol for 'please switch me in'. I looked up, three students were pointing to each other – our protocol for 'link us together, please'. I did. The next thing the Balmoral student said 'What on earth is happening?' Here were three boys (two year 8 and a year 10) playing and singing a wooden Heart at the top of their *basso profundo's*. My sensitive microphone had picked up their rendition and rivaled a 'Ghetto blaster'. Seriously though — they really wanted to share their work and enjoy it. They did!

Barbara Lipscombe is Principal of Casterton High School, and chairperson of the Advisory Committee of Resource Agreement 3. For Barbara, the Bal-Cas Music Program has been the concrete expression of the aims of RA3 – using technology to improve participation of country students in years 11 and 12. She has undertaken the innovative development work needed to get this project started and operating. An apparently unlimited energy has been projected into all three of these jobs, and in addition Barbara is timetabled for 14 teaching periods a week!

Heytesbury Cluster Music Program

How the Heytesbury Cluster was able to offer music studies, thanks to modern communications technology.

A report from teachers Bronwyn Lucas and Paul Brorteridge and a student perspective from Debbie Katsaros .

The Cluster

The Heytesbury Cluster is situated 250 kilometres south-west of Melbourne and is made up of four schools, Terang High, Timboon High, Camperdown High and Cobden Tech. The cluster has been active for a period of five years in a range of curricular and extra-curricular programs.

Realising that no individual school could mount a full music program by itself, a cluster music committee was formed.

Without Resource Agreement 3, no music would be in any of the cluster schools and no cluster-wide approach would have been attempted.

Bronwyn Lucas, Teacher, Cobden Technical School and Timboon High School

When I was seven years old, my father went to Oliver's auctions and purchased a piano to learn the piano. When I reached secondary school, I was offered a scholarship to start learning the cello which I thoroughly enjoyed. Throughout my secondary years I played in many orchestras including the Melbourne Youth Orchestra.

In Year 11 I decided to pursue music as a career so I chose to do Music A and Music B as two of my Year 12 subjects. The following year I was accepted into the specialist music course at Melbourne College of Advanced Education. At this stage I joined the Victorian State Concert Orchestra as well as several choirs.

During my years at college, I taught instrumental music at Errol St. Primary School, St. Leonards College, Vacluse College and Caulfield Grammar School.

I completed my course in 1987 and was offered my current position as a music teacher shared between Cobden Technical School and Timboon High School.

At Cobden Technical School, I teach eight classes of year seven and eight students per week. The students see me only once a week so we usually use the keyboard laboratory in every lesson. We have twelve keyboards so the class works on a roster system. Students alternate between learning practical skills on the keyboards and completing worksheets on theory and history that I have previously prepared.

The keyboard laboratory has provoked a sense of interest and enjoyment in music for most of the students. We work from a book which has simple melodies with four easy accompaniments which, when played together, turn into fulfilling pieces of music. The students enjoy this. The keyboard lab provides 'hands-on' experience for all students and this should lead to more students being interested in involving themselves in music in the future.

At Timboon High School, I teach two year seven classes for one semester and also run a Year Nine and Ten elective class.

Since the installation of the music equipment at Timboon, students have become a lot more interested in music. I believe that the keyboard lab has captured the interest of students who would otherwise have dropped out of music.

The year sevens work on a similar basis to those at Cobden but, as we have an extra lesson of music each week, there is also time for composition, improvisation and more history and theory.

While this new equipment has proved highly successful within each classroom, many problems still need to be solved in the running of simultaneous shared classes at each school...

The middle school elective students have been completing activities such as arranging pieces of music which we will soon record on our four-track recorder. They have also been learning practical skills on the keyboards which they have been recording from the synthesizer.

Next year, when we have year eleven and twelve students, there will also be an emphasis on using the Atari computer and software as the subject will be taught by correspondence and the computer will provide students with extra theoretical background and practice.

Debbie Katsaros, Music student

I'm currently a Year Eleven student at Timboon High School, and have had an interest in music since primary school.

This year, the school has purchased approximately $20,000 of musical equipment including a keyboard lab, a computer with software, a recording studio, and a work station.

The school was very lucky to have a music teacher for the first time in 17 years, her name is Bronwyn Lucas.

This new equipment together with the teacher has enabled me to pursue my interest and do Music as a Year 12 subject in 1989. I am looking forward to this and am considering studying music at a tertiary level the following year.

Paul Brotheridge, Teacher, Terang and Camperdown High Schools

Prior to the introduction of the music program in '88, I had been teaching English at Camperdown High for three years. However, my background and love was music. The opportunity to teach local students using new and exciting technology was going to be a challenge.

I had always been interested in classical guitar, and with this strong background I began writing musical compositions. Recently, I have moved into jazz (playing and composing).

With this background, I feel I have something to offer the students at my schools.

The installation of a keyboard laboratory, four track recorder, music dedicated computer and interface equipment has generated a great deal of interest amongst students from all levels of Terang and Camperdown High Schools.

Particular attention is being paid to levels 7 and 8 to ensure the future growth of music classes within both schools.

The keyboard laboratories are used extensively in this junior area. These classes have quite a vivid range of activities including singing, exploration of form, recent popular music history (evolution of rock'n'roll), composition as well as development of music reading and keyboard skills.

Year 10 and 11 students have concentrated on keyboard skills, composition and computer skills. Computer activities include recording melodious compositions, creating rhythm charts and recording popular songs with an emphasis on multi-timbral sound textures. Most of these students will have achieved independent control of the music computer by the end of the school year. The computer is also now used to supplement the body of sound produced by the school band and will be part of a live performance we are giving at Derrinallum High School in the near future.

While this new equipment has proved highly successful within each classroom, many problems still need to be solved in the running of simultaneous shared classes at each school, using the Hybrid / Duct communication link:

- The signal between schools has been too low for effective communication, although Neil Elliott (Bendigo) has made significant steps towards improving this recently.
- Questions about the supervision of the remote classroom are difficult to answer under present guidelines.
- School timetables have to be aligned.

Trials of Distance Education by Satellite in Far East Gippsland

Al. Balfour

Based on projects done at Bairnsdale High School where they have a sophisticated television studio, trials of the satellite systems were conducted during the latter part of 1988 in conjunction with the Victorian government's Vistel system. The trials have demonstrated that there are considerable possibilities both for schools and rural communities in satellite delivery of video, voice and data facilities.

During the latter part of 1988 the East Gippsland Hi-Tech Cluster of Post-primary Schools engaged in a series of distance education trials involving satellite technology. The East Gippsland Cluster consists of Bairnsdale Technical School, Bairnsdale, Orbost, and Swift's Creek High School and Cann River and Mallacoota Higher Elementary Schools. The distance from Bairnsdale to Mallacoota is almost the same as Bairnsdale to Melbourne and distance in East Gippsland is exacerbated by difficult terrain.

The Cluster, supported by RA3 and the Country Education Project, has been actively trialling various means of delivery of distance education and in 1989 is delivering in excess of twenty hours per week of lessons using the Mac-Fax-Duct telematic medium.

The Vistel system

The satellite trials were conducted in conjunction with Vistel — the Victorian governments communications initiative. Vistel gave considerable assistance to the trials in the provision of material resources as well as expertise in establishing satellite linkages between Cluster schools.

The trials were based on a relatively highly sophisticated television studio located at Bairnsdale High School which has been established as part of the East Gippsland video link project — a project aimed at a one way picture, two way voice microwave link between Bairnsdale and Orbost High Schools.

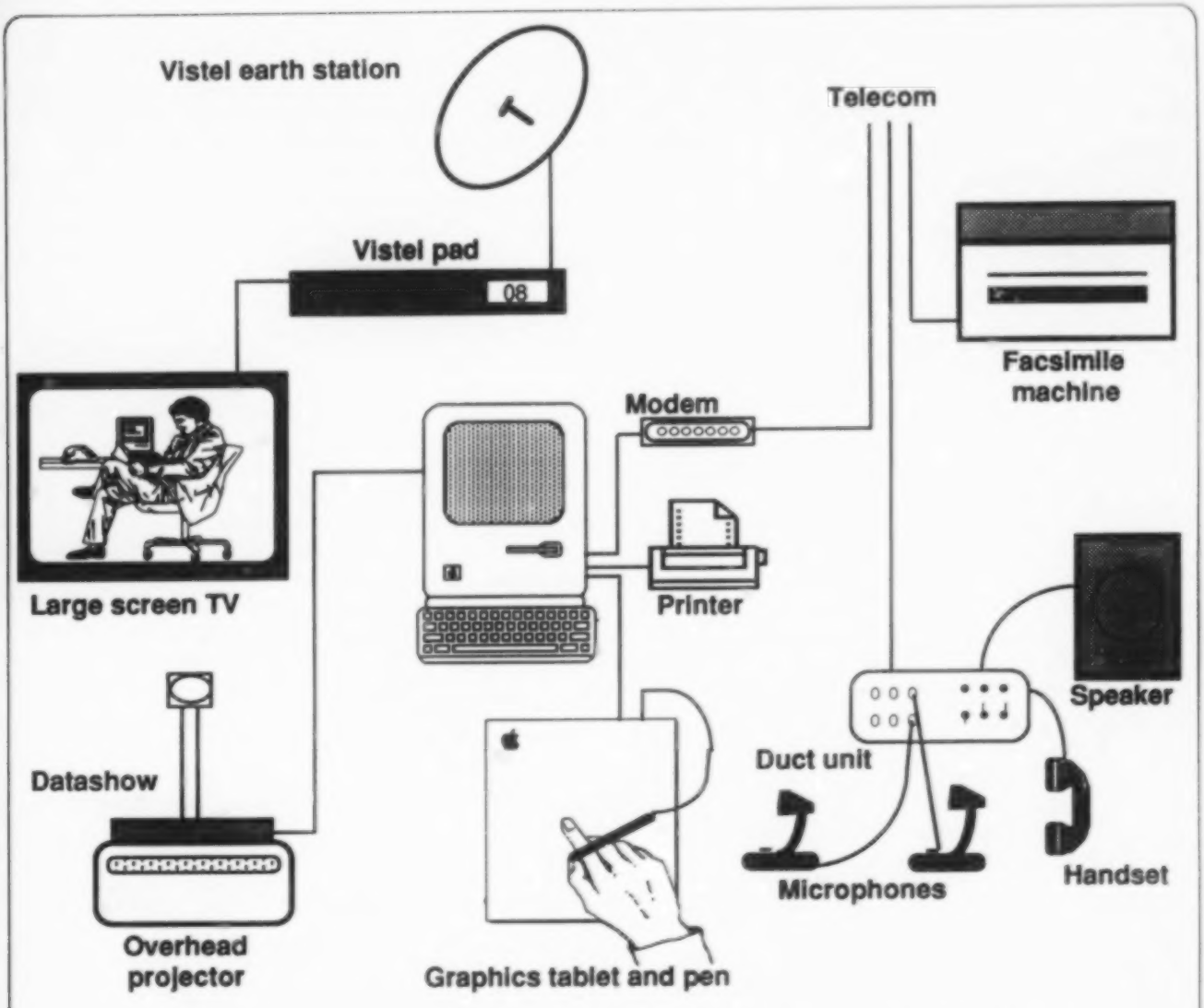
Vistel as part of its state wide development of telematics links provided a link to Melbourne via Russell Street Police Station and thence to a satellite uplift facility located at Burwood. The satellite uplift facility directed the signals emanating from the Bairnsdale studio and from Russell Street to the Aussat satellite in outer space. The satellite in turn directed these signals to receiver dishes located at the Far East Gippsland Post-primary Schools. Both picture and voice were directed to cluster schools by this method. Voice links both to Bairnsdale and Russell Street were provided by Telecom landlines and the Duct system. As a consequence dialogue was possible with the receiving schools.

It should be noted that the terrestrial link between the Bairnsdale studio and Melbourne operating independently of the satellite link-up provided a two way audio and two way picture link between Bairnsdale and Melbourne. More recently this link has been extended to include Geelong. Later this year it is anticipated that a studio facility will be located in Morwell and will allow a similar link with the Latrobe Valley.

The trials

A variety of trials were undertaken, involving both school and community groups.

At the school level a number of programs were delivered to the Far East Gippsland Schools based on Higher School Certificate revision. These included lessons in Biology and Australian History. A careers segment for years 11 and 12 was also delivered to outlying schools. In additions there was a direct link-up of teachers in Far East Gippsland schools with Peter Hill, Director of V.C.A.B., and Ann Borthwick to



Equipment used at the East Gippsland schools during the trials of Vistel one way video with two way audio and date transmission.

The potential for educational delivery lies not only in formal lesson delivery but also in professional development and delivery of special services.

discuss issues related to the implementation of the Victorian Certificate of Education. In another presentation Joan Kirner, Minister for Education, Ann Morrow, Chief Executive, and Don MacLean, General Manager of the Gippsland Education Region, met with parents, students and teachers from cluster schools to discuss current issues in education using the satellite hook-up.

At the community level a number of programmes using the video conference link to Melbourne were conducted. Regional heads of government departments and local government were provided with a demonstration of the potential of video conferencing. By this means participants were able to conference with Rob Jolly, Treasurer of the State of Victoria, and Peter Sheehan, Director General of the Department of Management and Budget. On another occasion councilors of the town of Bairnsdale conferred in an interactive way with officers of the Municipal Association of Victoria.

The above linkages have all sorts of implications not only in the delivery of educational services but also in wider community use.

The potential for educational delivery lies not only in formal lesson delivery but also in professional development and delivery of special services. But not only at the secondary level. The Gippsland Institute, now one of eight tertiary distance education centres in Australia, sees considerable possibilities in the future for off campus delivery using the telematics network as it develops statewide, and the satellite facility particularly if costs diminish with the advent of second generation satellites. Indeed there is a clear capacity to deliver overseas within the terrestrial foot-print of the satellite.

Possibilities for community use of the facilities

At a community level there are also a wide range of possibilities. The video conferencing link with Melbourne provides a relatively inexpensive means of visual communication for government departments with their head offices for conference and professional development purposes. The Road Construction Authority regional staff in Bairnsdale plan to use the link in this way. Similarly the Bairnsdale Town Council seeking further use of the facility. Video conferencing using terrestrial links as a carrier can compete effectively in financial terms with travel and accommodation to put personnel on site in a rural location as well as offering a significant benefit in time saving for the busy executive.

However when one turns to the use of satellite as a carrier for video delivery the picture is different. The cost structure developed for use of Aussat is prohibitive particular during the day time prime time. Certainly this cost structure puts video delivery beyond the capacity of the small cluster based educational provider and also general community use. This is an unfortunate situation in remoter rural areas in so far as Vistel's optic fibre routes will extend to major centres across the state but not further out to the smaller country towns such as Orbost, Cann River, Mallacoota and Swift's Creek.

There should be a strong case to put Aussat concerning the striking of a special educational rate for satellite delivery. This can only be achieved at a systems level and at a national level, I believed by a lobby developed by the Australian Educational Council to put pressure on government to recognise the educational and community use of satellite delivery as a service to rural communities rather than a commercial enterprise.

The systems worked well

The East Gippsland trials demonstrated the the technology does work and in a surprisingly easy fashion despite problems associated with learning a new technology and developing teaching strategies to make the most effective use of it. Generally picture quality was good – in fact excellent when using terrestrial links, not so good when on satellite, yet quite acceptable. Some of this loss of quality on satellite could be attributed to technical problems at the time at the Bairnsdale studio.

Generally sound outwards was also good. However voice return using the Duct system and Telecom land lines left something to be desired particularly in the earlier trials were problems were encountered with, clipping, echo, feed back and time delay. However it is possible that during 1989 the technology will advance to that point where voice out and return will be achieved via satellite thus dispensing with the need for Telecom land lines.

It was interesting to note that feed back from students and teachers in the outlying schools indicated that video was not necessarily essential to the learning process.

A clear advantage of video delivery via satellite is the capacity to multi point, that is to deliver voice and picture to a number of locations simultaneously and to have a talk-back facility. As a consequence it is possible to establish a fully interactive teaching situation across a variety of sites. This is not the situation with computer networks by satellite as is explained later in this article.

Feedback from the trials

Teachers and students adapted surprisingly well to the studio situation. Prior to trialling there were reservations that teachers would find lesson presentation in these circumstances uncomfortable and difficult. Most teachers and other adults involved in transmission adapted reasonably quickly to the studio situation and developed apparent comfort before the cameras. This is not to say that a half hour or an hour in front of the cameras is undemanding. The situation is a demanding one on the main players and clearly a fair amount of preparation is required ahead of time to achieve a satisfactory presentation. With repeated presentation and the continuing development of appropriate teaching and learning strategies this pressure may in fact lessen.

It was interesting to note that feedback from students and teachers in the outlying schools indicated that video was not necessarily essential to the learning process. Where there was a need for visuals video clearly was able to meet this need. However where visual delivery was of the 'talking head' variety use of voice supported by Fax was just as acceptable. This has clear implications for cost, picture on air time being reduced to situations were visual display is essential to the learning situation.

On the other hand the trials demonstrated fairly clearly that to put lessons to air does not require a full scale approach to production characteristic of commercial television nor the same sort of infra-structure. Quite creditable performances can be achieved with a minimum of effort. This is an important factor when it comes to the economics of educational delivery by school/cluster based video.

The production and delivery of programs at the Bairnsdale studio was handled by Year 12 Media Studies students manning two cameras, a technical assistant at the control desk and one

other person handling the talk-back system. With the development of a satellite talk-back facility this latter operator would no longer be required. It would be possible, therefore, to produce and transmit programmes with two to three operators. There are clear educational benefits to students of media studies utilising them as part of the production team. In passing it is of some interest that these students also have provided video footage for local TV news and a number of them have gained employment in the industry.

The satellite system can also be used as a carrier for inter-active computer networking between schools in place of Telecom land lines. Indeed it would be reasonable to assume that this would be a cheaper mode of delivery rather than dedicated Telecom land lines particularly where very high volume use was involved.

The cluster undertook a range of trials involving this mode of delivery. Whilst it was possible to gain high quality images on the screen there was a considerable delay factor which effectively interfered with the learning process. This is an issue for the software developers. This mode of delivery also has the same limitation as delivery by Telecom land lines in so far as it is only point to point. The next major advance must be in developing the capacity for multi-pointing, that is the capacity for numbers of computers to talk to each other.

The East Gippsland Hi-Tech Cluster has already been recognised and rewarded for its efforts at the level of National government having won a Gold Award . . .

Conclusion

To sum up, the East Gippsland satellite trials have demonstrated that there are considerable possibilities both for schools and rural communities in satellite delivery of video, voice and data. They have further demonstrated that it is well within the capabilities of teachers and rural people to make effective use of the technology, and to improve the quality of rural education, government and community life.

There are however problems to be overcome, some by the action of government as in the cost of satellite time, some by imminent advances in the state of technology, some by operators in the field as they develop new strategies for teaching and learning so as to take up the possibilities that are opening up before them.

The East Gippsland Hi-Tech Cluster has already been recognised and rewarded for its efforts at the level of National government having won a Gold Award from the Technology in Government Committee for the application of technology in government.

The East Gippsland Hi-Tech Cluster will continue satellite trialling during 1989 albeit on a more limited basis than in late 1988. An ongoing use will be made of the video conference facility between Melbourne and Bairnsdale both by schools, other educational providers, state and local government departments, and hopefully also by the community at large. The cluster will hopefully await for some resolution of the high cost factors involving with Aussat. And as available software increases in sophistication this will also be trialled particularly in the link between Mallacoota and Cann River Schools.

In conclusion, the East Gippsland Hi-Tech Cluster of Post-primary Schools would like to express its sincere appreciation and thanks to all who have assisted in the trials, particularly Vistel for its initiative and material and human support, the RA3 Advisory Committee, the Country Education Project, the Bairnsdale School Support Centre and of course dedicated teachers in Cluster schools without whom the trials could not have been conducted.

Al Balfour retired from the Ministry of Education at the end of 1987 after a successful and stimulating career terminating as Senior Education Officer in Gippsland Region. His record as a teacher and principal had been characterised by a dynamic, innovative approach to curriculum development and a strong involvement in all aspects of community life in the rural towns in which he has worked. These characteristics continue to be evident in his 'retirement' as he works tirelessly as an executive member of the East Gippsland Hi-Tech Cluster of post-primary schools and as coordinator for Far East Gippsland for the Country Education Project.

The Control Room in the Video Studio, Bairnsdale.

Using a Satellite in Distance Education: The East Gippsland Experience

By John Pritchard of *Contracted Time Savers* ™, Orbost

Descriptors: Satellite, Vistel, Video transmission. A number of thirty minute trials were conducted during November 1988.

Equipment used:

- Duct audio conferencing equipment with microphones.
- Macintosh Plus microcomputers with additional disc drives, high speed modems, and Imagewriter printers.
- 26 inch monitors.
- Graphic tablets with pens.
- Facsimile machines.

Carriers used

- Telecom land lines, Vistel (land lines and satellite).
- Earth stations (consisting of one metre dishes) were located at each school.
- Video transmissions emanated from the Bairnsdale Video Links studio, were relayed by land lines to Melbourne, transmitted to the satellite and then beamed to all schools in the network.
- Some non teaching trials have involved transmissions of video directly from Melbourne.
- Audio link to the schools was via satellite through the television receiver, voice back to Bairnsdale and to other schools, provided by the Duct audio link.
- Students and a technical officer operated the Bairnsdale studio equipment.

Lessons learnt – teaching

- Trials have been valuable to demonstrate that the technology works.
- Teachers who have 'volunteered' to use this equipment have adapted extremely well to the studio situation and one way audio contact with students.
- Students have adapted extremely well also.
- Individual teachers have used a variety of strategies to cope with the new experience.
- Some teachers reported a need for additional planning and preparation of material to be 'faxed' to the other schools, others did not change from normal practices.
- Without video feedback from students the teaching strategies similar to those developed for audio teleconferencing may be used.
- Audio links in this trial provided interactive capacity. Careful consideration needs to be given to the specific role of the video component in the session.

Indicators of priorities for use

The Vistel trials indicate that video broadcast techniques have great potential to provide access to specialists resources particularly in Melbourne, and guest speakers.

Report on technical aspects

- Picture: generally good. Excellent from Melbourne, adequate from Bairnsdale.
- Audio: generally poor. Echo, feedback and poor quality sound, have been reported as the major technical problems encountered in these trials. Time delay caused by dual mode of audio transmission has caused confusion and interrupted flow of dialogue and discussion.

Evaluating Resource Agreement 3: Some Issues

By Ian Conboy

This article provides some background overview of Resource Agreement 3. Local decision making, community involvement and resource sharing between schools are written into the Agreement's operational structure. Some of the issues on which the evolution of the Agreement could be based are considered.

Resource Agreement 3 is now two years old and it is timely to review some of its achievements and some of the issues it has highlighted. The Agreement has provided an immense range of valuable information which must be recorded if the Ministry of Education in total is to benefit from what has been an extensive social intervention into the operation of small rural post-primary schools in Victoria.

Cluster inservice activity in the Mallee Secondary College Cluster. Jenny Wakefield (Ouyen) and Sharron Morris (Manangatang) with Electricity Telepak materials.

Background

Resource Agreement 3 is the Ministry of Education's operational response to Recommendation 33 of the Ministerial Review of Postcompulsory Schooling (Blackburn Report) which states that:

> *The Education Department, drawing where appropriate on the expertise of the Country Education Project, develop, implement and evaluate electronic means of expanding the curricular range available to students attending schools in rural areas.*

Resource Agreement 3 is based on operating principles of the Country Education Project (CEP), the Victorian agency of the Federal Government School Commission Country Areas Program. Two of these principles, local decision making and community involvement are written into the Agreement's operational structure. The Agreement also emphasises a third objective, resource sharing between schools, and actively encourages them to organise into clusters for this purpose.

Because the conceptual thinking for the Agreement stemmed in part from the work the CEP had already undertaken with technology in rural schools and from some of the thinking to emerge from a Working Party on the Educational

Tekpak development has been significant because it has acted as a catalyst for cluster schools to communicate with each other.

Uses of Communication Technology which was chaired by Dr Ian Allen, the objectives reproduced below have a focus on possible different uses of technology in schools.

- To provide more subject choice in small country post-primary schools at levels 11 and 12 to encourage students to remain at school.
- To use computer databases of information to develop curriculum.
- To explore the feasibility of using technology to deliver student services such as speech therapy.
- To use technology for teacher inservice education programs.
- To provide inservice education in the management of distance education networks for school management and communities.
- To broaden education of disadvantaged groups in rural locations through use of technology.

However, it was the curriculum focus which was stressed by the State Advisory Committee and in the Memorandum distributed to schools clusters applying for funding were expected to develop an educational specification for using technology to enhance curriculum and improve retention of years 11 and 12 students (Executive Memorandum No. 111, 1987, 5).

Cluster applications of technology

Since teaching expertise is one of the most difficult resources to obtain and keep in small local schools, several clusters planned to use telematics to share teaching expertise between schools. The Mallee Secondary Colleges Cluster and the Wimmera Community Languages Program were the initial users of communication technology and some exciting developments are underway which will enable a teacher in any school in the clusters to teach small numbers of senior students in any of the other schools in the cluster simultaneously with students from their own school. They will have voice, document and interactive computer links with their remote students. While this system may not be as effective as a face-to-face interaction, it avoids lengthy periods of costly travel and unacceptable alternatives such as prolonged hostel accommodation. It also gives the students in each of the small schools, a larger peer group reference point with which to compare their progress.

As well as communication links, most clusters have identified a need for more curriculum materials in areas such as technology and technical studies, health sciences, community languages and music. In order to provide this additional curriculum cost effectively, they have borrowed the TEKPACK idea from South Australia (TEKPACKS, Wattle Park Teachers Centre). Technology packages (known in Victoria as 'tekpaks') consist of mobile resources of working models, teachers' guides, student materials, and sometimes tool kits which circulate between schools in the cluster on a preplanned schedule. They provide students with valuable practical experience in a range of technology and save individual schools the cost of equipping themselves. Several clusters including the Mallee Secondary College Cluster, the North-East Cluster and the West Wimmera Secondary College Cluster, have developed technology packages in a range of units. Tekpak development has been significant because it has acted as a catalyst for cluster schools to communicate with each other. Faculty groups from member schools who normally would meet infrequently maybe once or twice a year are now meeting regularly to design and produce tekpaks.

Another cluster in the Otways has preferred to share existing book and multi-media resources before establishing communication links between their schools. They are investigating a range of software suited to networking school resource centres. They have one large high school, a technical school and three small consolidated schools in their cluster. If they are successful, there will be a considerable potential for resource savings. Their project will become a model for other clusters to replicate.

One central initiative undertaken by the State Advisory Committee is an Electronic Curriculum Materials Library to supplement resources in small schools. The concept involved teachers loading exemplary curriculum materials into a central data base where this can be accessed by other teachers. A trial form of this service, EDMAC, is now online.

Developments (in local decision making and community involvement) have far surpassed the expectations of the original planners both in impact and originality.

While the overall objective of Resource Agreement 3 is firmly based in the government's social justice strategy to provide equal opportunity to disadvantaged groups such as those geographically isolated, the Agreement draws heavily on the government's economic strategy plan. Because clusters identified the provision of technological studies as a major weakness in their curriculum and have sought to overcome it with tekpaks, they are making a strong contribution towards the State's drive to increase technological studies in schools. They are doing this in the best possible way by providing students with hands-on experience with a variety of technical machines rather than learning about them second hand from videos or books. Clusters are providing these experiences economically by sharing the tekpaks and combining together to develop them. A further Government aim, closer links between schools and industry has been encouraged by tekpak development. Teacher designers are consulting with industry and attending industry run courses in order to provide better student materials in the tekpaks. They also may provide a catalyst for closer TAFE and schools links and perhaps the eventual cross-accreditation of courses. These developments will provide country students with more flexibility in course choice. The possibility of commercial development of tekpaks, with the continued participation of teacher developers and clusters, is being investigated.

Because school clusters have assumed ownership for Resource Agreement 3 and some of their teachers have been exceptionally innovative in exploring all aspects of technology in curriculum, the original aims contained in the Memorandum have ceased to serve as a guide for the Agreement. Developments have far surpassed the expectations of the original planners both in impact and originality. Therefore, it becomes imperative that any evaluation not be constrained by the original intentions of the planners but reflect the richness of the program as it has now unfolded. The evaluation must reflect the focus of the project on the school cluster and on the culture of the communities which the clusters serve. It is important that those desirable activities which cluster schools have previously provided still continue and have not been traded off for what may be perceived as improvements. However, it is equally important that cluster schools have operated in the best interests of all their students and have taken advantage of all opportunities which may be available from cooperation with other schools.

Jörg Behrandt (see pages 13 — 18) and Pam Nixon (East Gippsland TAFE Outreach) at the DEBIT inservice, December 1988.

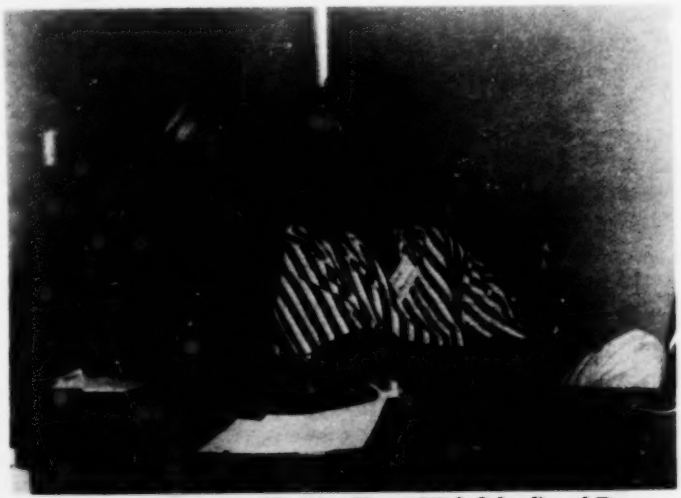
. . . those who are going to be most influenced by the evaluation must be involved in deciding key questions and selecting indicators of achievement.

Ongoing evaluation in clusters

Accountability is an important component of any funding agreement in education between the States and the Commonwealth with Resource Agreements becoming an important vehicle for Commonwealth financing arrangements (Dawkins, 1987). There are explicit accountabilities, and quantifiable outcome measures and recipients are required to volunteer performance indicators. While careful use of resources is to be encouraged, there are some dangers associated with relying too heavily on quantifiable indicators. What one understands of accountability is partly determined by one's understanding of what an educator does (D'Cruz in D'Cruz and Sheehan, 1978: 129). If the process is one of instructing-training, then readily quantifiable behavioural objectives are probably adequate. If however the process is far more diverse with an emphasis on students making judgements and reflecting on those judgements, then clearly simple quantifiable tests and indicators are no longer adequate by themselves. As one formulation of the concept has it:

> The different senses of accountability are logically linked to the differing objectives of the educator or to the objectives which the person who seeks accountability wishes to impose on the educator. The two senses of accountability, therefore, are a restricted sense which emphasises the more readily quantifiable, easily specifiable and clearly behavioural aspects of education; and a more inclusive sense which embraces both those elements of educators which secure and those which elude precise quantification and behavioural specification (D'Cruz, 1978: 129).

The Curriculum and Technology in Schools (CATS) conference in Bendigo supported the action research model as the appropriate way to evaluate Resource Agreement 3, and to establish that it is curriculum which is determining the technology and not the reverse (Conference Outcomes, 1987). There is support for the argument that those who are going to be most influenced by the evaluation must be involved in deciding key questions and selecting indicators of achievement.



Lorraine Le Plastrier (Boort High School) and Doug Westerman (Mount Beauty High School) at the DEBIT inservice, December 1988. Lorraine has been a driving force in developing the RA3 Inclusive Curriculum Tekpak. Doug has conducted trials of packet radio as a communications medium between schools.

The evaluation of Resource Agreement 3 is critical to future policies of the Ministry in relation to its response to information and communication technology developments. Evaluators should not only look for the consequences which they might reasonably have predicted at the beginning of the program but also the unanticipated outcomes or 'second order consequences'. Clusters should ensure that they cast their nets wide enough to assess community reactions to the project and to use the exercise as a way of informing people.

An evaluation might look at the main groups which have had some interest in the project—students, teachers, school communities, clusters and Regional and central administration.

Student Issues

Attitudes. Are they happy using the technology?

Skills. Are they acquiring new skills from using the technology and are there more subjects available to them as a result of the technology? Are they beginning to lose some valuable older skills? Are students involved in planning for technology in their school? For example, are they helping to design new courses and facilities?

Curriculum. Are there dangers emerging in terms of curriculum content? Are students selecting technology-based subjects at the

Will using the new communication technology make procedures such as supervision of students and detection of students who are having difficulties too difficult?

expense of the humanities subjects? Are curriculums starting to become distorted because of the additional interest being given to technology-based units.

Equity. Are they all sharing equally in the new technology? Do girls have equal access to the technology?

Services. Are students obtaining greater access to services such as speech therapy?

Interschool student communication. Are students using the technology to contact students in other schools?

Use of data bases. Are students accessing information from remote databases? For example, for careers information.

Teacher Issues

Much of the impetus and creative thinking associated with Resource Agreement 3 is coming from a small band of dedicated experienced teachers and principals located across Victoria. However, several serious issues raised by teachers need to be considered (Report of a survey of Far West Seeding Cluster Schools, 1987).

Administration and organisation. Will teaching with the new technology require excessive preparation time relative to the educational returns which might be expected?

Classroom practice and procedures. Will using the new communication technology make procedures such as supervision of students and detection of students who are having difficulties too difficult? How will practical subjects such as physics and chemistry be taught? Will the communication technology restrict teaching styles to a lecture?

Skill levels. Given the recent substantial changes to Victorian education, will teachers be able to cope with additional challenges?

Professional Development. What professional development is necessary for teachers to take full advantage of the new technology? What is the best method of providing this for small rural post-primary schools?

Social aspects of education. Will social and cultural aspects of education be ignored in favour of technology?

School and community issues

School autonomy. Is the technology threatening individual school autonomy? A pressing concern, at least in the short term is the threat of communication technology to the autonomy of some schools and their communities. This issue has been discussed in detail elsewhere (Conboy and D'Cruz, 1988). Generally, the more prominent characteristics of rural cultures are the greater emphasis on personal relationships, stronger religious and kinship affiliations, and stronger commitment to communities in general. This is reflected in rural education with parents in general having closer contact with their schools particularly at primary levels.

Community participation. What access is being given to other educational providers and to the local community? How involved are local communities in decision making in relation to use of technology?

Cluster Issues

Cluster management and operation. Network management is an issue in telematics projects (Martin, 1986). It usually centers on timetabling and appropriate scheduling of school activities such as excursions. As well, assessment styles, meetings and movement and maintenance of equipment require some cluster coordination. Have clusters developed the organisational structures to manage this complex initiative?

Inter-cluster communication. Inter-cluster communication is a necessity and the CATS conference Issues Group on Inter-cluster Communication gave clear guidelines to the State Committee to identify exemplary projects and produce a list of key contact people in Victorian schools (Conference Outcomes, 1987). Communication systems which are established should encourage this cooperation not only for schools but for communities as well. Clusters will need to ensure that inter-cluster competition doesn't develop to a point where resources are duplicated and rivalry prevents the best ideas being taken up.

Networking teaching between schools will require some modifications to the standard design of schools.

Statewide Issues

Cluster management. How does technology promote the development of clusters? What impact does technology have on the mix of resources required for small post-primary schools?

Teacher preparation courses. What steps should be taken to ensure that teacher preparation courses reflect the increased amounts of technology used in instruction?

Technology and inservice education. Can technology be better used to deliver professional development?

Courseware. To what extent can clusters produce their own courseware? What are the main constraints to teacher design of resources such as tekpaks?

School design. What physical conditions are necessary for schools to take full advantage of the new communication technology? Networking teaching between schools will require some modifications to the standard design of schools.

Coordination and logistic support. To what extent are Regional, School Support Centre and Statewide Telematics Unit personnel important? Clusters have been committed to interactive systems which allow maximum access for students, at a reasonable cost, to the Victorian ***Certificate of Education courses.*** These deliberations and negotiations with suppliers have underlined the importance of a research and information centre in educational technology and telematics.

Conclusion

This article is not intended to present all the issues arising from the Resource Agreement 3 initiative. Others, some cluster specific and some more system specific, will emerge. What RA3 has done is to give the Victorian Ministry of Education some insights into how technology can increase productivity.

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When the Advisory Committee for Resource Agreement 3 was formed in 1987, Ian Conboy was appointed Executive Officer. He has carried much of the hard administrative work needed in this large project, as well as much of the responsibility. His contribution to the work of the Committee has been immeasurable and his enthusiasm and optimism has been infectious. Being infected, the Committee could press on over cynicism about use of technology in education, doubts over the permanence of curriculum innovation in the school system, the inertia of the system and the conservatism of school communities. When RA3 is evaluated, much of the credit for its successes will be given to Ian Conboy.

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